LIFE'S DAY

GUIDE-POSTS AND DANGER-SIGNALS IN HEALTH

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GUIDE-POSTS AND DANGER-SIGNALS IN HEALTH

BY

WILLIAM SEAMAN BAINBRIDGE, A.M., M.D.

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MASSACHUSETTS SCHOOL
FOR THE FEEBLE MINDED.

SECOND EDITION

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To

My Life's Guide and Inspiration—
My Mother

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FOREWORD

This little volume, based upon a series of lectures delivered at Chautauqua, is intended to exploit no special theories concerning life and its problems. The author is not a faddist or an over-zealous enthusiast concerning any one of the various departments of science and philosophy which govern human conduct—physical, intellectual or moral; he is merely an earnest advocate of common sense and moderation in all things, and of the doctrine of cheerfulness and hope.

In the pages which follow he has endeavored to give a number of practical and helpful suggestions, to point out a few of the danger-signals, and to call attention to some of the guide-posts along life's journey.

His efforts will be amply rewarded if he may be able hereby to render the humblest service to any one, from the dawn of life to the coming of the night, or may in any degree succeed in lightening the burden for one whose lot it is to "teach in suffering what others learn in song."

INTRODUCTION

The march of man, since the dawn of human history, has been one of progress,—at some stages direct but very slow, at others indirect; at still others so round-about as to involve apparent retrogression; yet subsequent generations have seen in perspective that the pathway led always upward and onward.

Periods of time are remembered because of the character stamped upon them by important events, or, perhaps, because of the initiation or culmination within them of some far-reaching movement. Certain centuries seem to have been especially laden with a harvest of progress; others to have been apparently only the time of seed-sowing.

Thinking men and women, with justifiable pride, feel confident that the present is the age of the greatest advancement the world has ever known. Indeed, the claim has been made by Alfred Russell Wallace and other men of great learning that the progress of the century just ended is equal to that of all the previous centuries combined. There is, in truth, much to warrant such a belief. The telephone, wireless telegraphy, arbitration between warlike nations,—hundreds of illustrations might be cited to confirm this position.

When, however, the final history of our times is written, when the complete and just estimate of relative values is made, one of the most beneficent and praiseworthy characteristics of our day will be the great moral uplift—really a moral *renaissance*—which is manifest in almost every part of the civilized world. It is a tremendous influence, making striking changes throughout the busy life of the twentieth century. In dress, in business methods, in philanthropy, in the relation of man to his brother-man—all through the social fabric there is an awakening to the highest and the best.

This entire movement emphasizes the doctrine of individual effort toward the maximum development of the individual,—the advance of the whole through the advance of the unit.

Expressions of this new awakening are to be seen on every hand. Men are learning to-day, for example, what should long since have been known,—the great value of understanding the relative development of the child's mental and physical nature, and the dependence of one upon the other.

Until within recent years the attitude of society has been, "children should be seen and not heard," while the present may be called the "children's age" of the world's history. The pendulum seems to be swinging too far from the old way, so that often the child is the only member of the family who is heard; yet in this, as in other onward movements in the march of progress, gradual adjustment will doubtless come. Whereas formerly children of varied mentality and physique pursued the same curriculum in the same school, little consideration being given to the mental or physical defective, to-day the individual child is studied to determine what can be done to produce the best adult. The backward are helped, the defective receive somewhat of that which is lacking, and strong endeavors are being made in behalf of even the apparently hopeless idiot.

The clearing up of this confusion with reference to the classification of children, mentally and physically, has placed modern education on a more rational, certainly on a more humane, basis, and has spared the little ones many a needless heartache.

This awakening of the older generations to the rights of the younger augurs well for the possibilities of the generations to come, and gives promise of the realization of the newer and truer ideals of individual, national and international life. It points to a time, not far distant we hope, when, because of a more intimate and intelligent attention to the facts concerning individual hardihood—physical, mental and moral—the races of earth will attain, through health, happiness and length of life, a maximum of individual and racial efficiency.

INTRODUCTION

In the pages which follow we shall consider briefly the following factors which must be borne in mind in the development and maintenance of high physical and mental standards:

(1) *Heredity,* which wields its subtle influence from before the Dawn to the coming of the Night.

(2) *Environment,* which determines, in such large measure, whether the day be dark and gloomy or flooded with the sunlight of wholesome being.

(3) *Function,* which is the expression, through mind and body, of the activities evolved from inheritance and environment, —the manner in which Life's Day is spent.

These have been called "the three sides of the biological prism by which, scientifically, we seek to analyze the light of life." Blended with them, but not amenable to scientific analysis and classification, are other factors, more potent than all else, without which the highest and best is unattainable.

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Part I

HEREDITY AND ENVIRONMENT

Man, " on one side, exposed to the action of the elements which surround him, is subject to many inevitable evils; and if, in this decree, nature has been severe, on the other hand, just and even indulgent, she has not only tempered the evils with equivalent good, she has also enabled him to increase the good and alleviate the evil."

LIFE'S DAY

CHAPTER I

HEREDITY

IT is manifestly not within the province of this volume to attempt an extended exposition of the complicated and variously considered question of heredity. Its laws were applied empirically by the shepherds of the flocks and the tillers of the fields centuries before their full import was known. Scientific and philosophic minds have long sought to solve the problems involved in the apparently simple truths, "like begets like," and "the sins of the fathers shall be visited upon the children unto the third and fourth generation."

From the sum-total of this knowledge, empirical and scientific, practical and theoretical, has been evolved much of definite significance concerning racial and individual development.

It has been wisely said, "Since the issues of the individual life are in great part determined by what the living creature is or has to start with, in virtue of its hereditary relation to parents and ancestors, we cannot disregard the facts of heredity in our interpretation of the past, our conduct in the present, or our forecasting of the future."

What, then, is this power for good or ill, this heritage from our "myriad millions of dead ancestors?"

"Heredity," says Ribot, "is that biological law by which all beings endowed with life tend to repeat themselves in their descendants: it is for the species what personal identity is for the individual. By it a ground work remains unchanged amid incessant variation; by it Nature ever copies and imitates herself." Every manifestation of life, whether vegetable or animal, normal or abnormal, physical or psychical, is subject to this law. "Understood in its entirety, the law is that each plant or animal produces others of like kind with itself; the likeness of kind consisting," according to

Spencer, "not so much in the repetition of individual traits, as in the assumption of the same general structure."

By some the law of heredity is believed to apply only to the main characters and not to the details of structure; by others it is thought to be applicable to the minuter elements, to special characteristics, and to acquired modifications.

Adherents of the latter position seek to substantiate their views by the tangible proofs furnished by stock-breeders, agriculturists and gardeners, as well as by the interesting experiments of zoölogists and botanists.

For example, in 1791, in Massachusetts, a male lamb was born, which, by chance, was possessed of short, crooked legs and a long body. Because of its inability to leap fences it was thought to be valuable, and from it was raised, by selection, the "semi-monstrous" ancon sheep. Another breed, with special characteristics which were more easily converted into money, supplanted the ancon, in time, and so it became extinct.

Another example cited is that of a merino ram which was remarkable for its long, smooth, straight, and silky wool. From this was raised a breed whose fleece sold for considerably more per pound than any other merino. Certain blemishes, such as small bodies, large heads, long necks, narrow chests, and long flanks, which characterized the first members of the breed, were removed in time by careful selection.

So remarkable have been the results obtained by sheep breeders, that one observer said, "It would seem that they had chalked upon a wall a form perfect in itself and then given it existence." A skilful breeder claimed, with reference to pigeons, to be able to produce a given feather in three years, but that it would take him "six years to obtain head and beak."

In all of these statements, according to Spencer, the tacit assertion is, "that individual traits are bequeathed from generation to generation; and that, when they are not brought into conflict with opposite traits, they may be so perpetuated and increased as to become permanent distinctions."

The most striking example of breeding which is cited in support of the theory that acquired modifications may be inherited, is furnished by Darwin's familiar experiments with pigeons. He kept every breed which he could purchase or obtain, had skins from several quarters of the globe, associated with pigeon fanciers, and even joined two Pigeon Clubs, during the course of his experiments. Darwin was astonished at the diversity of breeds. The eleven species and sub-species, and about one hundred and fifty additional varieties, he believed to be descended from one common ancestor, the wild blue rock-pigeon. His belief was that varieties could be obtained in a few generations by careful interbreeding. This was proved by his own precise and scientific experiments, as he was able to breed every variety known to him from the rock-pigeon.

The application of certain phases of the law of heredity to plant life has attracted considerable attention of late years, because of its distinctly commercial significance. For example, the particular bane of the wheat grower is a fungoid disease known as "rust." It has been estimated that the average annual loss to the wheat crops of the world caused by this disease is about five hundred millions of dollars. The few varieties of wheat known to be naturally immune to "rust" are inferior in other respects, and consequently unprofitable to grow. By certain "crossing" experiments with immune and susceptible varieties, a wheat has been produced which combines large yielding capacity, excellence of straw, and strength of grain, with the very desirable quality of immunity to yellow "rust." When this immune variety has been cultivated in sufficient quantities to supplant the old susceptible varieties, the financial gain from such experiments will doubtless be enormous.

What has been said with reference to the inheritance of details of structure and function in plants and animals is held by the advocates of this theory to be equally true of man in his physical and psychical nature. "Not only is he possessed of a certain constitution, a certain nervous organization, which predisposes him to feel, to think, and to act after a manner peculiar unto himself, but we may affirm that the experience of countless generations slumbers in him."

So completely is the dominance of this influence accepted by some that they seek to excuse their failures on the basis of an unfortunate heredity. Others, on the contrary, hold that the direction and extent of progress is mainly determined for them by the obstacles which beset life's pathway, and that it is dependent in no degree upon heredity.

The belief sometimes expressed that all men are born free and equal, that each is unqualifiedly master of his fate, is a pleasing fallacy. It is thought by many to apply everywhere and always, or nowhere and never; they refuse to accept it in its limited application. Nevertheless, many an infant enters the world a slave, the victim of poverty—poverty of brain and poverty of body—a veritable prisoner of vice. The birthright of many another is wealth—wealth of brain and wealth of body; he is a veritable free man.

While heredity is not a myth, but something very real, we know that the living being is subject also to the action of its environment and modified by it, and that man, considered as a thinking, sentient being, does not escape this law. "Chance, but especially education, may develop his intellect, his character, his imagination, his sentiments."

The hope, courage, and power acquired through favorable environment and education may gain a victory over many of the ill effects of heredity. Say, then, to the child, "You can make of your life what you will. You are free to carve out and mold your own character and destiny." But upon the teacher and parent urge the fact that heredity must not be overlooked as a definite factor in development, one to be reckoned with as an active, or at least a latent force, helpful or harmful. Unfortunately, many fail to apprehend the necessity of the early recognition of and intelligent dealing with inherited defects or evil tendencies.

CHAPTER II

PHYSIOLOGICAL HEREDITY

THE possible application of the laws of heredity to the entire physiological nature,—to all the elements and functions of the organism,—is a subject which has called forth spirited discussion. The mechanism of physiological heredity, the method by which the law operates,—whether through somatic cell or germ-plasm,—is still a mooted question with which we shall not concern ourselves. Some examples of its application are cited for the purpose of emphasizing the importance of the purely physical side of individual development.

External Structures.—The inheritance of physical characteristics is clearly illustrated by various individual features. The shape of the nose, the size of the ears, the expression of the mouth and eyes, the color and texture of the hair and skin, the size and general build of the body, and even certain physical defects in the parent, may be passed on to children and grandchildren. It is expected that parents who are well above the average in stature will have children who are tall. The converse is also true. Obesity sometimes seems to "run in the family," the tendency to accumulate flesh appearing in the individuals of some families as a real organic predisposition, developing amidst surroundings which are far from advantageous, even poverty and hard work not seeming to hold it in check. A goodly number of the patronymics of olden times are known to have had their origin in featural characteristics transmitted from sire to son. Thus, in the literature of ancient Rome, the long-nosed Nasones, the thick-lipped Labeones, the big-headed Capitones, etc., figure more or less conspicuously.

Solid Internal Structures.—The osseous framework of the body is more or less affected by heredity, it being well known that peculiarities in the conformation and size of the various bones may be inherited, as well as excess or defect of certain parts, such as vertebrae or teeth. A supernumerary finger or toe is sometimes found for three or four generations.

The Muscular System, including the *heart,* is subject to the same laws, as are also the *digestive organs,* as regards both anomalies of size and shape and peculiarities of function.

The Blood.—The class distinction which has long been based upon the so-called "blue-blood" theory has, perhaps, a certain foundation in physiological fact, for it is well known that the members of some families have more blood than those of others, and that it differs in quality. This may be an advantage or a disadvantage, socially or physically, according to the degree of variance from the normal type.

A larger amount of blood than normal may mean a predisposition to apoplexy or hemorrhage, and a greater tendency toward acute inflammation. In some families this predisposition is passed down from generation to generation.

The tendency to bleeding varies among people generally, in certain individuals being sufficiently marked to be considered a distinct disease, known to the medical profession as hemophilia. This is supposedly due to the absence of certain mineral constituents of the blood, and a large factor in the condition seems to be heredity, although other causes, such as consanguinity, are thought to be active. In the history of nearly every case of hemophilia it is possible to trace connection with a family of "bleeders."

The condition is handed down in a curious fashion. Though occurring much more commonly in males than in females, it is almost invariably transmitted through the female, so that it is not passed on by "bleeders," but by "non-bleeders." All males in a hemophilic family are not affected, and as the majority of those who have this peculiarity die before they reach adult life, the condition is comparatively rare.

In some families there has been noted a relationship, apparently influenced by heredity, between anemia or "blood poverty," and melancholia.

The Central Nervous System, consisting of the brain and spinal cord, is said to be more or less regulated by transmitted influences. This, if true, has an important and definite relation to the functions of the body as a whole. Whatever affects that part whose function it is to bring every organ and tissue of the body into harmonious relation with every other, and to adjust the body as a whole to its environment, must of necessity be of vital importance.

Longevity.—Length of life is influenced by the initial vitality with which each individual is born, quite apart from considerations of hygiene, locality and civilization. Minot has aptly compared life, or the power of assimilation upon which it depends, to a top set spinning. If proper impetus has been given it, it may run for a long time, but it runs with ever decreasing force and rapidity, and finally runs down.

Yet the initial vitality in the child, just as the initial impetus in the top, may be influenced through external conditions. The preservation of this initial vitality in the child, or its development if it be deficient, are essential questions to be considered in the education of the child and in the maintenance of adult vigor and health.

Life insurance companies, as a definite business proposition, take into consideration the history of longevity in the family of the applicant, just as they take into account chronic alcoholism or other factors that affect vitality. An individual whose ancestors have been short-lived, or who have been addicted to the excessive use of alcoholic stimulants, is not considered as desirable a risk as one whose ancestors have lived longer or abstained from the use of alcohol.

Immunity from and Susceptibility to Disease.—These are subjects which, in recent years, have engrossed the attention of the scientific world. Natural immunity and susceptibility are believed to be influenced by heredity, and this idea has given rise to much speculation and many interesting experiments concerning acquired or artificial immunity and susceptibility.

Acquired immunity has a direct bearing upon the maintenance of health and the treatment of disease, and will be referred to from time to time in the pages which follow. While the subject is still obscure in many respects, much of practical value has been evolved in the line of serum-therapy,—vaccination for small-pox, antitoxin in diphtheria, the Pasteur treatment of hydrophobia, the Flexner serum for cerebro-spinal meningitis,—all of established value, and other measures which are still in the experimental stage, whose utility is yet to be fully determined and accepted.

Immunity to disease is now generally believed to be applicable to infectious diseases —those due to pathogenic germs and their toxins—and not to constitutional affections, to such processes as Bright's disease, circulatory disturbances, errors in assimilation, etc. By immunity, then, is meant "that condition in which an individual or a species of animals exhibits unusual or complete resistance to an infection for which other individuals or other species show a greater or less degree of susceptibility."

Natural immunity (in contradistinction to that which is acquired) is now believed to be, for the most part at least, an inherited condition. It is well known that many diseases to which man is susceptible cannot be inoculated into animals, and *vice versa.* This natural immunity may be racial or individual, and may be manifested in various degrees. Negroes are relatively immune to yellow fever and ague, and certain individuals appear to be immune to smallpox and other diseases, even in the midst of epidemics. Natural immunity, whether racial or personal, is thought by some to be the gradual outcome of natural selection, though the mechanism of immunity is still a debated question. Certain factors, as we shall presently see, seem to afford protection to the individual from the various disease-producing germs, and are therefore potent in the maintenance of natural immunity.

The Skin is the camping ground of certain virulent micro-organisms. These germs exist normally on the skin or between the superficial horny cells, but, with rare exceptions, they are unable to penetrate the unbroken skin and to produce disease. Under certain conditions the sweat glands with their ducts, and the hair follicles with their sebaceous glands, may become vulnerable points through which micro-organisms may become active, causing pustules, boils, carbuncles, etc.

The Mucous Membranes, chiefly by virtue of the mechanical action of the mucus secreted, furnish a certain protection against infection. In the mouth, where something like thirty species of micro-organisms flourish, the normal saliva exerts a protective action. It is not germicidal, but it inhibits the growth and reduces the virulence of some of the disease-producing germs found in the mouth; it also mechanically removes the micro-organisms.

The eye is protected by the glands which secrete the tears, the nose by the mechanical action of the hairs growing at the entrance, the lungs by the mucus of the bronchial walls, the stomach by the bactericidal action of the gastric juice, and the intestines by the bile and intestinal secretions. The protection in all these cases, however, is limited, and varies with varying conditions.

The resisting power of the tissue cells of the body, as well as of the connective tissue strands which form the framework for these cells; the antiseptic power of the blood plasma, and the ability of certain wandering cells, the phagocytes or fighting cells, to ingest injurious particles or harmful germs, are further agencies in the maintenance of natural immunity.

While the above-named elements exert a certain protection against infection, and are, to that extent, potent in the maintenance if not in the production of natural immunity, the prime factor is now generally regarded as a certain anti-bacterial or antitoxic property inherent in the tissues and fluids of the body.

Susceptibility to disease, racial and individual, seems to be influenced by heredity. Thus some families appear to be peculiarly susceptible to tuberculosis, rheumatism, gout, insanity or various nervous disorders.

Inheritance of a predisposition to disease must not be confounded with inheritance of the disease itself. In rare instances tuberculosis, syphilis, small-pox and other infectious diseases have been known to be acquired *in utero,* so that the child is born with distinct manifestations of the disease; but this is presumably contagion, not inheritance. Strictly speaking, no disease is inherited. Martius has pointed out that a disease is not an entity, not a character, but an abnormal *process,* which is initiated by some external cause. The *potentiality* involved in such a process may be transmitted, but not the process itself.

It is held by others that, under favorable circumstances, predisposition to disease tends to die out in the course of transmission. Even Thomson, who holds that no disease is inherited, in speaking of inherited predisposition to certain constitutional affections, says: "We must recognize that every item in an inheritance requires an appropriate nurture if it is to be expressed, or expressed fully, in development. This nurture is to some extent in our hands. Adaptive nurture, individual hygiene, change of habits and habitat, and the like, may prevent or inhibit the expression of a predisposition. In short, the organism is extremely plastic—for the better as well as for the worse."

CHAPTER III

PSYCHICAL HEREDITY

UNTIL within recent years relatively little attention has been given to the consideration of the psychical phase of heredity, yet it is most intimately associated with and dependent upon the purely physical side, and is, therefore, of the utmost importance from the beginning to the end of life.

Just how important a part heredity plays in the mental equipment of the individual may be surmised from the following statistics quoted from the *British Journal of Children's Diseases*: Fifty-one per cent. of idiots have histories of mental defects in the family; twenty per cent. have histories of epilepsy in the family; sixteen per cent. have histories of alcoholism in the family. Forty per cent. of mental defects in children are caused by alcoholism.

A study of the pathology of the mind shows that all kinds of psychological anomalies, whether of passions, of crimes, or of insanity, are directly affected by the laws of heredity.

Maudsley, in his "Body and Mind," says: "Perhaps of all the erroneous notions concerning mind which metaphysics has engendered or abetted, there is none more false than that which tacitly assumes or explicitly declares that men are born with equal original mental capacity, opportunities and education determining the differences of subsequent development. The opinion is as cruel as it is false. * * * Men differ, indeed, in the fundamental characters of their minds, as they do in the features of their countenances, or in the habit of their bodies; and between those who are born with the potentiality of a full and complete mental development, under favorable circumstances, and those who are born with an innate incapacity of mental development, under any circumstances, there exists every gradation. What teaching could ever raise the congenital idiot to the common level of human intelligence? What teaching could ever keep the inspired mind of the man of genius at that level?" From no fault of his own, says Dr. Maudsley, is the idiot deprived of his human birthright, but it is by no means clear that it is not from some fault of his parents. "It is all too true that, in many cases, there has observably been a neglect or disregard of the laws which govern the progress of human development through the ages. Idiocy is, indeed, a manufactured article; and, although we are not always able to tell how it is manufactured, still its important causes are known and are within control. Many cases are distinctly traceable to parental intemperance and excess."

Morel has traced through four generations the family history of a youth who was admitted to the asylum at Rouen in a state of stupidity and semi-idiocy. The summary of this history is interesting. The first generation showed immorality, depravity, and alcoholic and moral degradation, the great-grandfather having been killed in a tavern brawl. The next generation had, in the grandfather, the record of drunkenness, maniacal attacks, ending in general paralysis; while the third generation showed, in the father, sobriety, but hypochondriacal and homicidal tendencies. The youth at Rouen, of the fourth generation, showed defective intelligence, progressing to stupidity and complete idiocy, while his sisters were defective physically and morally, and were classed as imbeciles. The influence of heredity in this case was further proved by the fact that the illegitimate child of the boy's mother showed no signs of degeneracy.

Criminal anthropology, the study of "criminal man in his organic constitution, and in his life as related to his physical and social environment," is a subject in which rapid strides have been made within the last few years. It has a direct bearing upon any comprehensive study of human life. The question cannot be ignored, "Is the criminal, and in what respects is he, a normal or an abnormal man? And if he is, or when he is, abnormal, whence is the abnormality derived? Is it congenital or contracted, capable or incapable of rectification?" Enrico Ferri, in "Criminal Sociology," draws attention to the mental constitution of the criminal, holding that "human actions, whether honest or dishonest, social or anti-social, are always the outcome of man's physio-psychical organism, and of the physical and social atmosphere which surrounds him."

To the mind influenced solely by scientific thought the criminal may seem to be wholly at the mercy of heredity and environment. To others, who see over and above all science the Master Hand, there comes the hopeful thought that Divine Power is able to save to the uttermost.

The moral element, "the last acquisition of development in the progress of *humanization,*" is commonly the first to suffer when deterioration begins. "He who is deficient in moral sense," says Maudsley, "is a defective being to that extent; he marks the beginning of race-degeneracy; and, if better influences do not intervene to check or neutralize the morbid tendency, his children will exhibit a further degree of degeneracy, and be actual morbid varieties. What shall be the particular outcome of the morbid strain—whether vice, or crime, or madness—will, of course, depend much on the circumstances of life; the inborn fact counts for much, but not for everything, in the result."

Ribot holds that heredity may be referred to habit, and that heredity, like memory, is but one form of the universal mechanism, of which memory itself is but one aspect. Heredity "is a specific memory: it is to the species what memory is to the individual." If, now, we pause to consider just what memory signifies to the individual,—if we accept the statement that it is a "kind of incipient instinct," and that, by multiplication of experiences, as Spencer tells us, memory is made stronger, and by further multiplication of experiences "conscious memory passes into unconscious or organic memory" (instinct),—we reach the encouraging conclusion that, after all, heredity is not all-powerful. Modification is possible, and by taking note of the "latent and incessant part" which the "infinitesimally small" plays in the evolution of humanity, what has been bad heredity may, in time, be converted into that which is good. The process of modifying this "habit of heredity" may be slow, but surely it is worth the while of those who hold that "humanity and not self should be the concern of him who would rise to a higher self." It is interesting to note some of the results of psychical heredity which, by proper environment and education, it may be possible to attain.

In examining the family histories of fifty-one poets of high rank Ribot shows that twenty-two had one or more distinguished relatives. Among this number are such names as Burns, Byron, Goethe, Heine, Schiller, Milton, and Tennyson.

In a list of forty-two painters (Italian, Spanish and Flemish), held to be of the highest rank, Galton found twenty-one who had illustrious relatives. Of this number were Michael Angelo, Correggio, Raphael, and Van Dyck.

Among the great musicians whose family histories were studied by Ribot, only four (Bellini, Donizetti, Rossini and Halévy) were found to constitute exceptions to the law of heredity. The most interesting example of mental heredity is that of Sebastian Bach. The Bach family, beginning with Weit Bach, a baker, in 1550, continued through eight generations to produce musicians. Twenty-nine really eminent musicians belong to this family.

The list of men of science who have conformed to the laws of mental heredity is very long. While it is not without such interesting exceptions as Comte, Copernicus, Descartes, Galen, Galvani, Hume, Kant, Locke, Priestley, Spinoza, and others, these but serve to substantiate the claim sometimes made that new lines of heredity may be projected in unexpected directions.

In statesmanship, in military and naval life, in the commercial world, and in the various professions, may be found many interesting illustrations of the law of heredity applied to the mental attributes of the individual.

National character no less than individual, by virtue of that law of Nature that like shall beget like, is preserved, in its essential qualities, by heredity. "The permanence of national character is at once the result and the experimental proof of psychological heredity in the masses."

CHAPTER IV

ENVIRONMENT

THE influence of heredity upon the individual life is undeniable. Equally indisputable is the fact that each human being, in both physical and mental constitution and function, is subject to the modification of environment. "Every theory of education, every discipline, from that of the arithmetician to that of the prize-fighter, every proposed reward for virtue or punishment for vice, implies the belief, embodied in sundry proverbs, that the use or disuse of each faculty, bodily or mental, is followed by an adaptive change in it—loss of power or gain of power, according to demand." Climate, mode of life, laws governing conduct, home conditions, wealth, poverty, amusements, art, literature, occupation, dress, education, nutrition,—all exert a greater or less influence upon the physical, mental and moral life of the individual, the unit of society, and upon the sum of the units, society itself.

No detail of environment is inconsequent. Whether the living-room be papered with red or yellow may seem to the unobservant to have nothing to do with the mother's management of her children—and yet it has, or may have. Whether the teacher wear a red ribbon or a pink one at her throat may not appeal to the superior wisdom of the Board of Education as having the slightest influence upon the discipline of the class—and yet it has, or may have. The "psychology of color" may be utilized in many ways.

Social activities are the aggregate results of individual ambitions and desires. "The progress from wigwam to good houses has resulted from wishes to increase personal welfare." Modern education, modern philanthropy, and modern correctional methods, take full cognizance of the fact that the final outcome of the individual life depends in large measure upon environment during the formative years, and that no detail of that environment should be wilfully ignored.

This does not signify that good environment is necessarily synonymous with affluence. By no means. True, "to have the dread of hunger, to work sore and yet gain nothing,—this is the essence of poverty," yet the perception of life as a fine art is not incompatible with poverty. Even the most squalid surroundings are not inconsistent with the larger life so long as one is earnestly determined to rise above them.

"Of all the myriad moods of mind
  That through the soul come thronging,
Which one was e'er so dear, so kind,
  So beautiful as Longing?
The thing we long for, that we are
  For one transcendent moment,
Before the Present poor and bare
  Can make its sneering comment."

By the magic wand of "Longing" the cave-dwelling has become the palace, the simple life of the aboriginal forest has been transformed into the complex existence of the metropolis. Environment has become more and more complicated with each successive step in the onward march of progress, each successive generation is confronted with new problems peculiarly its own. Matters which, a generation or so ago, were considered purely individual, are now recognized as communal, and are regulated by law or public sentiment.

And so it has come about that the purely physical aspects of environment,—Food, Shelter and Clothing,—as Education and other matters pertaining to the intellectual, moral and spiritual phases of life, have received increasingly earnest attention as society has become more and more complex. A better understanding of each of these factors has been potent in furthering the great moral *renaissance,* to which reference has been made. And "If the springs of life are sweet, its waters pure and abundant, its courses clear of contamination or obstruction, both body and mind healthfully active, with sufficient diversity of occupation, we shall find life deepening with added years—its best wine saved for the final draught."

FOOD

Man's dietetic requirements have ever been dependent upon his physical surroundings. The Esquimo would find macaroni as unsatisfactory a diet as the Neapolitan would find the blubber consumed by his northern brother. Whether "flesh, fowl or fish," or a reasonable admixture of these, constitute the diet of a people, it must meet the requirements of the mode of life. Vital resistance is in large measure determined by the food supply. Whatever the diet, it must serve to nourish the body, to keep every part of the organism up to the highest standard of health, despite the changes incident to growth and development in youth, the wear and tear of the active years of adult life, and the inevitable deterioration of older age. It must keep the individual parts of the body in harmonious relation to each other, and the body as a whole in harmony with its environment.

In former years the interest in the subject of diet seemed to center around the question of the quantity rather than that of the quality of the food. Sanctorius (Venice, 1614) was very much interested in the subject, particularly with reference to "insensible perspiration," by which was understood the invisible exhalations from the body. In order to determine the amount of this in its relation to the intake of food, he made experiments upon himself and others. He made it a practice to weigh himself before each meal, and to partake of the meal while seated in a chair to which was attached a weighing device so adjusted as to account for the intake of food. When the chair tipped to a certain point he immediately ceased eating.

Subsequent investigators began to attach more importance to the quality of the food, and there has been built up an elaborate science dealing with the processes of digestion and assimilation, the relative values in point of energy, heat-generation, muscle-building, etc., of the various food-stuffs.

Many "diet delusions" have been exploded in this process of construction, and many more have been formulated to take their places. There is a theory to suit every taste (and every phase of "indigestion"), and each dietary is apparently proven by a sufficient number of gymnasium and other experiments to lend to it a certain degree of plausibility. The homely saying, "What is one man's food is another man's poison," is as pertinent to-day as when first propounded, and many, from the confusion of theories, are coming to believe that, after all, "eating is a matter of temperament."

Furthermore, any food, however perfect, may become poison to the human organism under certain conditions. Unless the foodstuff, whatever its nature, be appropriated by the human machinery, it becomes, to a greater or less extent, a direct poison. If the organism is in particularly good working order this poison, if not too great in quantity, will be completely thrown off through the various excretory organs, and no lasting harm result. On the other hand, it may become a foreign body, a veritable "external irritant." Thus the unappropriated food may inaugurate a chain of symptoms which pave the way for the development of a series of pathological processes, often leading to permanent impairment of health. The nerves, muscles, and all the body tissues are exhausted, general weakness follows, and the end is death.

On the other hand, the irritant may be as violent within the alimentary canal, or in its passage thence throughout the blood stream and cellular tissues, as an escharotic applied to the skin, and quick destruction of life may follow. The intake of food may be too great, and the residue remaining unassimilated, if not eliminated, may became the culture medium for various disease-producing bacteria, and these or the poisons which they elaborate may completely overwhelm the organism.

The recently exploited theory of the "poison of fatigue," set forth by Weichardt, and made by him to apply to muscle, must (if applicable at all) be a factor in the complicated process of digestion, where the "fatigue toxin" would seem most likely to be manifested. This leads to the thought that foods which become poison in the system may become so, in part at least, because of the "fatigue toxin" elaborated in the process of digestion, assimilation and elimination.

This, however, like many another phase of the food question, is within the domain of theory, and is mentioned merely as an interesting field of possibilities for some zealous student, who may establish the reality of the toxin, discover the antitoxin, and thus solve many dietetic problems.

SHELTER

In ancient times the dwelling, whether cave or hut or palace, was designed to protect the occupant from enemies, man or beast, from without, and incidentally from the rigors of climate. Little attention was paid to the rules of sanitation and hygiene such as are observed in modern times. The window spaces were reduced to a minimum, light and air being of less importance to primitive man than security from his tribal enemies. External adornment and interior decoration were of little import compared with strength of walls to resist attack.

The problems of shelter, however, have increased in complexity with the general evolution of society, until the question of housing the masses has come to be one of tremendous importance. It has such direct bearing upon health and disease that it has become a matter for government, municipal and philanthropic investigation and control. Mills, factories, shops, schools, and places of public assembly, as well as hospitals, hotels and homes, present questions of heating, lighting, ventilation and sanitation, all of which have a definite relation to the health and happiness of the community.

The dust, sand, soot, pollen, waste dirt from dwellings, street refuse, remains from plant and animal life, and the disease-producing germs which commingle with these, are impurities encountered out of doors.

They are not more harmful than those which may be encountered in the home, the workshop, the school, the theatre and the church, when these are improperly constructed, poorly ventilated, and carelessly cleaned. In addition to dust, epithelial cells, bacteria, hair, particles of food and bits of cloth found in enclosed spaces, the air may also be polluted by gaseous and semi-gaseous impurities,—human exhalations, the products of combustion.

The natural purifiers, air and sunlight, should be allowed full opportunity to exercise their beneficent function. Oxygen, the most important constituent of the air, is the great supporter of life, the destroyer of harmful organic impurities, the converter of food into heat and energy. Without the requisite proportion of oxygen in the air which is constantly breathed, the cheek loses its color, the strength fails, the resistance to disease is lessened, and the individual readily succumbs to whatever ailment may develop.

In an effort to correct the evils wrought by impure air and insufficient light, the subjects of hygiene and sanitation, personal, municipal and social, have been evolved and are receiving earnest attention on all sides. The thousands of dark, close rooms and workshops in the cities are breeding-places for disease-producing germs and for insect purveyors of these.

The painful truth of this assertion is borne out month by month by the mortality records of the cities, particularly with reference to tuberculosis. The investigations conducted by Dr. Osler among the sick poor of Baltimore showed bad sanitary location in 62 per cent. among Russian Jews, 53 per cent. among negroes, and 16 per cent. among whites. In 61, 41 and 32 per cent., respectively, there was overcrowding, and in 70, 56 and 30 per cent., respectively, there was found personal and household uncleanliness. In New York City there are 361,000 six-foot-by-seven dark closets called bedrooms, whose occupants work in sweatshops, factories, stores, offices, and homes. When we add overcrowding, uncleanliness, bad drainage, defective ventilation, and deficiency of sunlight to underfeeding and overwork, it is not difficult to realize that tuberculosis—the disease of the dark bedroom and workshop—claims annually more than 10,000 victims in New York City alone. When we consider the fearful extent to which the utilities of life are contaminated by these 10,000 unfortunates, the urgent need for proper housing becomes manifest.

CLOTHING

Clothing, the third of the purely physical factors in environment, is perhaps the least important, though it is by no means to be ignored. Along with food and shelter, it has undergone modification to meet the requirements of changed conditions of climate, occupation, and the complexities of civilization. The principles of sanitation and hygiene have been more and more applied to dress, both with reference to fabrics employed and the manner of their use. The old-time idea that the body could be kept warm only by the quantity of clothing, has given way to the more rational modern belief that quality is of paramount importance. The thick and impervious woolen garments of a few years ago have given place to the more sanitary light-weight fabrics of to-day, which allow free ventilation of the body, unhampered locomotion, and quick reaction to change of temperature. Fad and fashion continue to wield a powerful influence in the matter of dress. With a certain proportion of the population playing the rôle of an auxiliary street-cleaning department, and with many other customs in dress which are a menace to health, it is plain to be seen that there is yet ample room for improvement. The general tendency to rational methods in other phases of physical environment leads to the hope and the belief that the generations of the future will suffer no evil consequences, physical, mental or moral, because of the unwise dictates of Dame Fashion.

CHAPTER V

EDUCATION

ANOTHER factor in the shaping of human destiny is education. The purpose of education, in its broadest sense, is far more than merely to train the individual in school or college. It is not time-limited, but extends from the beginning to the end of life. Its purpose is admirably expressed in the following paragraph from Spencer's "Education": "How to live?—that is the essential question for us. Not how to live in the mere material sense only, but in the widest sense. The general problem, which comprehends every special problem, is—the right ruling of conduct in all directions under all circumstances. In what way to treat the body; in what way to treat the mind; in what way to manage our affairs; in what way to bring up a family; in what way to behave as a citizen; in what way to utilize all those sources of happiness which nature supplies—how to use all our faculties to the greatest advantage of ourselves and others—how to live completely? And this being the great thing needful for us to learn, is, by consequence, the great thing which education has to teach. To prepare us for complete living is the function which education has to discharge; and the only rational mode of judging of any educational course is to judge in what degree it discharges such function."

Spencer classifies, in the order of their importance, the various kinds of activity which constitute human life, and which are therefore concerned in education, as follows: "1. Those activities which directly minister to self-preservation; 2. Those activities which, by securing the necessaries of life, indirectly minister to self-preservation; 3. Those activities which have for their end the rearing and discipline of offspring; 4. Those activities which are involved in the maintenance of proper social and political relations; 5. Those miscellaneous activities which make up the leisure part of life, devoted to the gratification of the tastes and feelings."

One phase of education, according to Spencer, has been universally neglected, viz., that which prepares for parenthood. "Seriously," he asks, "is it not an astonishing fact that though on the treatment of offspring depend their lives or their deaths, and their moral welfare or ruin, yet not one word of instruction on the treatment of offspring is ever given to those who will hereafter be parents? Is it not monstrous that the fate of a new generation should be left to the chances of unreasoning custom, impulse, fancy—joined with the suggestions of ignorant nurses and the prejudiced counsel of grandmothers? If a merchant commenced business without any knowledge of arithmetic and book-keeping, we should exclaim at his folly, and look for disastrous consequences. Or if, before studying anatomy, a man set up as a surgical operator, we should wonder at his audacity and pity his patients. But that parents should begin the difficult task of rearing children without ever having given a thought to the principles—physical, moral, or intellectual—which ought to guide them, excites neither surprise at the actors nor pity for their victims." Fortunately, each year witnesses some progress in this important direction, and it is safe to predict that the generations of the future will come more nearly into their birthright—the right of being well born.

If "inherited constitution must ever be the chief factor in determining character," or even a potent influence, it behooves the expectant mother to lay the foundation of that constitution, and of the character dependent upon it, long before the actual dawning of the day of life.

Intelligent thought and careful study should replace the dependence upon "instinct," which was formerly considered an efficient guide at this period. So mighty and far-reaching are the responsibilities resting upon the expectant mother that other members of the family should do their part by affording to her the comfort and help of a gentle and loving home life. It is far better that the mother should take time for the enjoyment of the best in music and art and literature than that she should starve the mind and weary the body in the preparation of a too elaborate outfit for the expected little one. Well is it for the little charge when it is received and intelligently cared for by a mother with quiet nerves and high aspirations!

The proper regimen of the expectant mother is so important, not only for her own welfare, but for the whole future of the unborn child, that her ignorance or indifference concerning the subject is deplorable. Numerous admirably written books and articles giving the necessary information are easily accessible to all women except the very poor. The needs of the latter class of women are coming more and more to be recognized, and in Vienna, Paris, London, and a few other cities, there have been established benevolent institutions where the en-

MASSACHUSETTS SCHOOL
FOR THE FEEBLE MINDED.

ciente poor are fed, and in some instances clothed, treated, and instructed concerning their own welfare and that of the coming child.

The first to treat education in a scientific spirit was Comenius (1592-1671), who based educational methods upon an understanding of the nature of the child, and who recognized education as the development of all the faculties of body and mind. Through the periods marked by the work of Rousseau, Pestalozzi and Froebel, to the present, with such leaders as Mann, Harper, Eliot, and Adler, education has become more and more a potent factor in molding human destiny. Clearer views of the nature and aim of education have prevailed, the laws governing human development have come to be more fully understood, and coincidentally the profession of teaching has been elevated to meet the demands of scientific education. "Human reason," as Painter has said, "unfettered by tradition or the dicta of authority, is everywhere proving all things, and holding fast only that which is good.

The present age is an age of experiment and investigation. Able minds in all Christian lands are engaged upon educational problems. While all this leaves the educational world in an unsettled condition, it promises well for the future. Within the past few decades truth has made large conquests in the domain of education. And, as we may well judge, both from the lessons of the past and the tendencies of the present, there will come forth from this struggle an education firmly established on a scientific basis, and better adjusted to the conditions of modern life."

"All our schemes of education, intellectual and moral," says Le Conte, "though certainly intended mainly for the improvement of the individual, are glorified by the hope that the race also is thereby gradually elevated. It is true that these hopes are usually extravagant; it is true that the *whole* improvement of one generation is not carried over by inheritance into the next; it is true, therefore, that we cannot by education raise a lower race up to the plane of a higher in a few generations or even in a few centuries: but there must be at least a small residuum, be it ever so small, carried forward from each generation to the next, which, accumulating from age to age, determines the slow evolution of the race. Such the hopes on which all noble efforts for race-improvement are founded."

With the author of "Some Silent Teachers," we believe that "Over and above the too exclusive study of heredity, which leads to *fatalism,* down below the exclusive study of environment, which leads to *despondency,* shines the light of the thought that *self-activity* is greater than any barriers placed by ancestry or by surroundings." Let us, then, consider some of the practical details of *Function,*—the development and maintenance of self-activity during the Dawn, the Morning, the Noontime, and the Eventide of Life's Day.

PART II

DAWN

" We are borne into life—it is sweet, it is strange!
We lie still on the knee of a mild mystery,
Which smiles with a change."

CHAPTER VI

INFANCY

WHEN the little stranger has been welcomed, the real work of care, development and education begins. From this time on, till the morning of life has merged into the midday, eternal vigilance is the watchword of the wise and thoughtful parent and teacher.

"This creature of unstable equilibrium," the infant, is "a mass of potentialities," yet it is the weakest and most helpless of all mammalian offspring. The kitten, blind though it be for the first few days of its life, is not so helpless as the new-born babe. Many other animals come into the world well equipped for the battle. The guinea-pig, for example, is fully clothed with hair, its teeth are already developed, it is alert, keen of eye and of ear, and able from the first to avail itself not only of the milk with which nature has provided its mother, but also of the food supply from which the mother herself gains sustenance. This little creature an hour old will help itself to oats, hay, lettuce, or whatever food is convenient, without waiting upon ceremony. How different with the helpless infant! The latter is practically blind, except that it can distinguish light from darkness; its power of hearing is imperfectly developed; its stomach is more a receptacle for food than a digestive apparatus; it is " a spinal being, with an unformed, diffluent brain, composed largely of water."

And yet this infant, weak and relatively imperfect as it is, by reason of this very weakness and imperfection, has much to do —it must *eat* and *sleep* and *grow,* and nothing should be allowed to interfere with this important work. Especially should it not be increased by needless coddling, bouncing, or other tax upon the infant's energies, whether to elicit a smile or to hush a cry caused by hunger, pain, or the discomfort of improperly adjusted clothing.

Physical Examination.—Every infant, soon after birth, should be given a thorough physical examination by the attending physician, in order to ascertain the possible existence of abnormalities which may interfere with normal development. If such are found, it is important that they be given attention according to modern surgical procedure. The child should not be deprived of its right to physical and mental health—and perhaps moral health as well—by any false sentiment on the part of parents. How often, against the doctor's advice, the infant with hare-lip, cleft-palate or tongue-tie, is allowed to reach childhood, and often adult life, with the deformity uncorrected, and with speech, digestion, respiration, and often mental development, materially impaired. The same negligence applies to club-foot and other malformations, all of which should be corrected, if possible, in early childhood. In short, the child ought to pass through the morning of life unhampered by any defects which surgical skill can safely correct.

Growth and Development.—The rate of growth of an infant is an important index to its general health, hence familiarity with the weights and measurements of average normal infants is important. Irregularities in relative development are often the first indications of disturbed nutrition or of the beginning of disease. Increase in bodily weight, in height, and in the measurements of the limbs, in the normal child, bear a certain definite relation, one to another, at different periods of development.

From a study of the records of three large maternity institutions in New York City, the average birth weight of 568 female infants was found to be 7.16 pounds, and that of 590 males to be 7.55 pounds. During the first three days of life there is a loss in weight of about ten per cent., which is usually regained by the end of the first week. With the normal infant, the increase from this time on is constant. The period of most rapid growth is during the first three months. The first six months of life should show a gain of from four to eight ounces each week. When it falls below four ounces, it is to be inferred that something is wrong. The food may be deficient in nutritive quality, or it may be too highly nutritious for the digestive powers of the child, or, for some other reason, the food cannot be properly assimilated. The failure to gain in weight may also be due to some organic, constitutional or infectious disease.

Naturally the growing capacity varies in different infants, but the healthy child usually doubles its birth-weight by the fifth or sixth month, and at the end of the first year its weight should be something over two and one-half times more than at birth. From five to seven pounds is the normal increase during the second year. Irregularities in relative growth, therefore, are danger-signals which should be heeded.

The length of the baby at birth varies from nineteen to twenty-one inches. During the first year the increase is nearly double that of any succeeding year, the average gain of the second year being four inches. The height, however, is of much less significance with reference to the infant's general condition than is the weight.

Coincidental with the increase in weight and height there is a relative development of the various parts of the body. The legs grow much more rapidly than the trunk. Normal growth is largely determined by the girth of the head and chest. The chest circumference at birth is less than that of the head, but before the end of the second year, the chest should exceed the head in girth.

Because of its compressibility, the chest is peculiarly liable to deformities. Prolonged pressure from improper position, constriction from ill-fitting clothing, prolonged respiratory embarrassment from adenoids and greatly enlarged tonsils, and retarded bone development, as in "rickets," may give rise to deformities of the chest, with consequent interference with the function of the lungs and heart. It is especially important that the infant be safeguarded in this direction.

The increase in the circumference of the head is most rapid during the first year, increasing three inches during the first six months, about one inch the second six months, and three-quarters of an inch the second year. Head growth disproportionate to the development of the rest of the body is indicative of hydrocephalus or dropsy of the brain, commonly called "water on the brain."

Correlated with the growth of the body of the normal infant is the development of its faculties, sight, hearing, coördinate movements, locomotion, and speech. As the child's brain develops, the movements of its body, which at first were purely reflex, become more and more under control. By about the fourth month the child is able to hold up its head, and by the seventh month it can sit alone. About the ninth or tenth month, efforts are made to creep and to stand, and walking is generally accomplished between the twelfth and sixteenth months. By the end of the first year the infant attempts to pronounce syllables, and at the end of the second year it is able to speak a few words.

For convenience of reference, the following table, compiled by Dr. L. Emmett Holt, is given, showing the average weight, height, circumference of head and chest, from birth to the tenth year. The table applies to boys, and it should be borne in mind that the weight of girls is usually about one pound less than that of boys. They are of about the same height. The weights for the first four years are taken without clothing.

At birth	Weight	7½	pounds
	Height	20½	inches
	Chest	13½	inches
	Head	14	inches
One year	Weight	21	pounds
	Height	29	inches
	Chest	18	inches
	Head	18	inches
Two years	Weight	26½	pounds
	Height	32½	inches
	Chest	19	inches
	Head	19	inches
Three years	Weight	31	pounds
	Height	35	inches
	Chest	20	inches
	Head	19¼	inches

Four years	Weight	35	pounds
	Height	38	inches
	Chest	20¾	inches
	Head	19¾	inches
Five years	Weight	41	pounds
	Height	41½	inches
	Chest	21½	inches
	Head	20½	inches
Six years	Weight	45	pounds
	Height	44	inches
	Chest	23	inches
Seven years	Weight	49½	pounds
	Height	46	inches
	Chest	23½	inches
Eight years	Weight	54½	pounds
	Height	48	inches
	Chest	24½	inches
Nine years	Weight	60	pounds
	Height	50	inches
	Chest	25	inches
Ten years	Weight	66½	pounds
	Height	52	inches
	Chest	26	inches

Hygiene of the Organs of Special Sense.—This is a subject which is largely neglected, and yet it has a direct bearing upon the health of the child, as well as upon its physical and mental development.

Lips and Tongue.—Touch and taste are

the first of the special senses to develop, being essential to the child's instinctive efforts to obtain sustenance. The lips and tongue are chiefly concerned, and, being practically free from the danger of injury, they require no special attention other than that given to the mouth. (See p. 71.)

It is thought that the infant, shortly after birth, can distinguish sweet, bitter, sour, and salt tastes.

The baby's tongue is coated, as a rule, throughout the nursing period, so that this is not necessarily significant of alimentary disturbances, as is generally the case in later years.

Nose.—The sense of smell is slightly developed in the infant, yet the nose requires special care. The nostrils need to be kept clear, and any obstruction hindering proper nasal respiration must be removed. While adenoids, bony enlargements, and polypoid growths in the nose are not so apt to occur in infants as in older children, their possible existence must not be overlooked.

If the infant manifests a tendency to

"colds," the nose should be carefully examined. If no obstruction is found, the colds are probably due to a catarrhal condition of the mucous membrane of the nose and naso-pharynx. This may be caused by bacterial invasion, by malnutrition, sudden changes of temperature, or inherited tendencies.

Repeated colds keep the mucous membrane swollen and engorged, and this condition, together with the blocking of the nostrils with secretions or discharge, interfere with proper breathing, prevent sufficient ventilation of the middle ear, and may be the cause of earache, and perhaps other serious complications.

The nose may be kept clear by means of some bland oily solution, such as albolene, introduced by means of an atomizer or nebulizer, always under the direction of a physician, with proper instructions as to their manipulation. All efforts at cleansing the infant's nose and nasal cavities must be very gentle.

Ear.—The child at birth is deaf, except to sharp, shrill sounds, beginning to recognize familiar voices at the end of the second month. The hearing becomes more and more acute as the months pass.

Aside from accumulations of wax in the external auditory canal, and skin diseases to which the external ear is liable, and which require professional attention, the organ of hearing needs little care other than that demanded by ordinary cleanliness.

Earache is not uncommon in young infants, and often results, as we have already seen, from obstruction in the upper air passages. It generally causes persistent crying. Sometimes the infant pulls its hair or places its hand to the affected side. When earache is suspected, the physician should be called at once, as careful examination is imperative, the earache not infrequently being the forerunner of very serious trouble. The practice of dropping warm sweet oil, laudanum, and various other domestic remedies, into the baby's ear, without competent advice, cannot be too strongly deprecated.

Eye.—The eye at birth is imperfectly developed, and it is not until the end of the second month that the infant can really see. Previous to this, the eye is attracted by light and the infant may blink upon the near approach of objects. Some dim impression may thus be conveyed to the brain centres, which should at this time be perfectly quiescent. The absurd efforts so often exerted toward making the little one notice things demand an unnecessary expenditure of nerve force, and, if persisted in, will only serve to make the infant irritable, and may lay the foundation for more serious trouble.

The eye should be kept clear of accumulated secretions and dirt. We have already seen that for the first two months of the child's life the tear-producing apparatus is inactive, and consequently the eye is not cleansed by tears, as it is at a later period. To cleanse the eye, a piece of soft linen or absorbent cotton, dipped in lukewarm salt or boric acid solution (one-half to an even teaspoonful to a pint of water) may be used.

Ophthalmia Neonatorum.—When the appalling fact is realized that *one-quarter of* *all the blind children in all the schools for the blind in this country are unnecessarily blind,* the importance of the care of the eyes in infancy becomes apparent. The official census of the blind for the State of New York, taken in 1906, gives a total of 6200 blind persons in the State, of whom 1984, or 33 per cent., were cases of preventable blindness. Of these preventable cases, 620, or 10 per cent. of the total number of blind persons in the State, were caused by ophthalmia neonatorum, an infectious disease of the eyes of the newborn. The average admissions in ten schools for the blind show 25.21 per cent. to be victims of this disease. In other words, one-quarter of the new pupils for 1907 were needlessly blind.

The disease is at first easily controlled, and when it is allowed to progress to the point of destruction of sight, it is due to criminal negligence on the part of the physician or other attendant.

Those whose duty it is to provide proper medical attention for mother and babe should insist (if it be not done voluntarily) that the necessary precautionary measures be instituted to insure the newborn infant against possible infection of the eyes. The physician, or the trained assistant under his supervision, should cleanse the infant's eyes at the earliest possible moment after its birth. For this a solution of boracic acid or warm water may be used. The preventive measures now employed by all competent physicians under such circumstances should then be resorted tc, the nitrate or some other form of silver being the accepted remedy.

This treatment, properly and promptly administered, will prevent infection, thus saving much needless suffering and, in many cases, loss of vision.

When, however, such precautionary measures have been neglected, and the infant's lids become inflamed and swollen, and the edges matted together with purulent secretion, no time should be lost in securing expert medical attention.

Care should be exercised with all appliances used in the care of the eyes under these circumstances, for the disease is highly contagious and may be easily conveyed to other members of the household.

Digestive Apparatus.—A brief review of some of the essential features concerned in the wonderful process of digestion and assimilation, by which materials outside the body are appropriated and become a part of the organism, may not be amiss in this connection.

For this process a complex apparatus is provided: (1) For *receiving* the ingested materials, mouth, œsophagus and stomach; (2) for *propelling* them, stomach and intestines, with their powerful muscles; (3) for *digesting* them, the digestive fluids of the stomach and intestines. The first two processes are physical or mechanical, while the third is chemical. After the food has been so changed that it can pass through an animal membrane, and can be assimilated, there is needed (4) an *absorbing* apparatus of large surface, the mucous membrane of the small intestine, with its innumerable folds and projections.

Mouth.—The fact that the teeth of the young infant have not appeared, does not signify that its mouth needs no special attention. It should be cleansed once a day with a piece of fine linen or cotton, wet with a weak solution of boric acid, or, as some prefer, simply boiled water. Care must be taken not to rub the gums hard enough to abrade the delicate mucous membrane.

The mucous glands of the mouth secrete a fluid which serves as a protection to the mucous membrane.

The secretion of saliva is very slight up to the third month, and contains very little, if any, ptyalin, the ferment which acts upon starch, converting it into sugar.

By the third or fourth month the saliva becomes much more copious and contains more ptyalin.

The first stage of the digestion of starchy food takes place in the mouth. Here it becomes mixed with saliva, which partially converts it into sugar, and practically nothing further is done for substances of this class until they have passed out of the stomach into the intestines. If, then, the coarse starch reaches the stomach unchanged by the action of the ptyalin of the saliva, the result is fermentation, the food value is largely lost, and noxious gases are produced. Here is to be found the explanation of many an attack of colic. Starchy foods, such as oatmeal, rice, farina, bread, etc., should not be given to the young infant, except in the form of gruels and jellies, where the process of cooking, for not less than two and one-half hours, is such that the starch cells are thoroughly broken up.

Stomach.—The stomach of the very young infant is tubular in shape, almost vertical in position, and is formed by a slight dilatation of this portion of the alimentary tract. The sphincter muscle, which separates the œsophagus from the stomach, is imperfectly developed at this time. The muscular power of the stomach is weak, hence its peristaltic action is very imperfect, and its propelling power is correspondingly inefficient. The constriction between the stomach and intestine, which exists in the adult, is absent in the child at birth, the lessened resistance allowing the food to pass from the stomach into the intestine with less power from behind.

The capacity of the stomach is as follows:

At birth	1	ounce
End of 1st month	2½	ounces
End of 2nd month	3½	"
End of 3rd month	4½	"
End of 4th month	4¾	"
End of 5th month	5	"
End of 12th month	8-10	"

Of course this capacity varies with different infants, but the table gives an approximate idea of the amount of food normally required, and shows how easily an indulgent mother may fall into the habit of over-feeding the little one.

The stomach of the infant is more a receptacle for food than a digestive organ. The gastric juice at this time is only very slightly active upon proteid food (casein in milk, meat fibre, etc.), but it is rich in rennin, or milk-curdling ferment, which acts upon the curd of milk. When milk enters the stomach of an infant it is coagulated by the action of the rennin. In the case of mother's milk very fine curds or flocculi are formed, but cow's milk, if undiluted, is converted into hard, firm, coarse curd, which must pass out of the stomach into the intestine before being thoroughly digested.

Intestines.—The intestines at birth and in early childhood are relatively much longer, and their capacity much greater, than is the case in later years. The muscular walls are weak and poorly developed, and hence the tendency to flatulence and constipation. The intestine grows very rapidly in the infant, and, as a consequence of this rapid growth, may be easily overtaxed, inflammation may result, and the infant become the victim of colitis and various intestinal disturbances.

The mucous membrane of the small intestine is like velvet, and in it are millions of tiny elevations (villi) and depressions, which greatly increase the surface for the work of absorption,—the chief function, in infancy, of this part of the alimentary tract.

Of the ferments which later complete the process of digestion in the intestine,—trypsin, which digests proteid matter (casein, meat fibre, etc.), and steapsin, which digests fats,—are barely active in infancy, while amylopsin, which digests sugars and starches, is generally considered to be totally inactive at first and only feebly active for a long time after birth. For this reason it is a pernicious practice to give bread, potatoes, cereals, scraped meat, etc., to the young infant. As the child develops, however, and the various digestive ferments become more active, small quantities of scraped meat, meat juice, very well-cooked cereals, etc., may be given to the healthy, vigorous infant.

Nervous System.—The development of the manifold functions, and the keeping of all in harmony, depend upon the nervous system, which is relatively immature in the little one. The brain and nerves are not prepared for any great strain; they are prepared for their essential work, but not for that which is unnecessary. Nearly all the nerves in an infant are non-medullated, that is, without a protective sheath. The brain, which, as we have already seen, is in a stage of incomplete development at birth, grows relatively more in size during the first two years than at any other time of life.

The steady increase of functional diseases among children is a most powerful argument for greater attention to the hygiene of the nervous system. Even in infancy the child should be carefully safeguarded in this respect. The little one needs quiet, rest and sleep while these immature nerves and this rapidly growing brain are attending to the essential work of development.

Food.—It goes without saying that the natural food supply (mother's milk) surpasses all others for the infant. If this is ample, and of good quality, little need be said concerning the feeding of the baby other than to urge the importance of regularity by day and no nursing, as a rule, between 10 P. M. and 6 A. M., after the fourth week. This implies, of course, that the infant is neither over-fed nor under-fed.

So important in its relation to health is the natural food supply of the infant, that philanthropists in London, Paris, and elsewhere, are engaged in the work of promoting breast-feeding among the poor. To this end, institutions such as "Allaitement Maternel," in Vienna, " Œuvre du Lait Maternel," in Paris, the Chelsea Kitchens and the St. Pancras School for Mothers, in London, and other similar benevolent organizations, are seeking to lower infant mortality by helping enciente and nursing mothers properly to nourish their offspring by being themselves properly nourished.

When the natural source of supply is inadequate as to quantity or quality, resort to artificial feeding is obligatory, and should be carried out according to the directions of a competent physician. The indiscriminate use of prepared infant foods, broths, cereals, and various soft foods, is to be deprecated. As we have already seen, the alimentary tract of the infant is not supplied with the digestive ferments necessary for the utilization of foods which later it can appropriate with ease. Hence, the substitution of an artificial for the natural food has been the subject of much study.

Cow's milk is the most available and satisfactory substitute, but it varies sufficiently from the mother's milk in composition to require modification before it is most readily assimilated by the young infant. It contains fat, sugar, proteid (casein), and certain salts, just as does the mother's milk, but in different proportions. It is always preferable, as we have said, that the necessary modification be made under the direction of the family physician. This is imperative for the child's welfare should there be any indication that the food, as given, is in any way inadequate.

The source of supply of cow's milk is of the utmost importance as affecting the health of the infant. If taken from tuberculous or otherwise diseased animals, or if it is contaminated at any stage of its manipulation, milk may be the source of appalling infant mortality. For this reason much time, money, thought, and even legislation, have been devoted to the obviating of needless and sometimes criminal negligence in this direction. Such efforts have been fraught with an encouraging measure of success.

Milk may become contaminated in the following ways:

(1) *Diseased Cows.* It has been stated that fifteen to twenty-five per cent. of dairy cows, when tested for tuberculosis with the "tuberculin test," will be found to have the disease. It has been demonstrated, also, that cows showing no external physical evidences of tuberculosis may be affected, and that milk from such animals contains germs of that disease. Furthermore, the excreta from cows so affected may be contaminated with tubercle bacilli, and, through careless handling may infect the milk. The germs of other diseases may contaminate the milk of affected animals.

The subject of dairy inspection and the examination and testing of cows has received a great deal of attention in various localities within the last few years. Wonderful improvements have been wrought in many instances, but many glaring evils are yet to be corrected.

(2) *From the Udder and Body of the Cow.* Large numbers of bacteria fall from the body and udder of the cow into the pail in the process of milking. One examination, for example, revealed the fact that when the udder was merely wiped off with a dry cloth, bacteria at the rate of 19,000 per cubic centimeter (about fifteen drops) fell into sterile milk which was exposed under the udder while the cow was being milked.

(3) *Contaminated Utensils.* The utensils used in the dairy, as well as those in the household, may be the source of contamination of milk. It is not infrequently the case that the vessels will be cleansed and then set aside for hours before being used. In the meantime, the dust, laden with bacteria, has settled upon them, thus rendering them bacteriologically unclean. Vessels should al-

ways be scalded immediately before being used.

(4) *By Pouring From One Vessel to Another.* In the act of pouring milk from one vessel to another, a large surface of the milk is exposed to the air, and thus numbers of bacteria which are floating in the air are taken up by the milk.

(5) *By Exposure to Air in the Stable.* Many bacteriological experiments have been made to determine the truth of this supposition. For example, nearly three thousand germs have been found to have fallen in seven minutes into fifteen drops of sterilized milk placed in a sterilized vessel in a stable of more than average cleanliness. At this rate something like 250,000,000 germs would contaminate a quart of milk left exposed for this length of time, if presenting a proportionate surface.

(6) *Containers in Stores and Milk Depots.* In many localities, where Boards of Health are not vigilant, this is one of the most frightful sources of contamination. In the poorer sections of the larger cities, and even

in better quarters, milk is kept in open cans, exposed to all the dust and filth of the street and the surroundings.

(7) *Contamination by Flies.* It is by no means an uncommon sight to see a housewife and mother, otherwise scrupulously clean, lift a fly out of the milk with which she is about to feed her infant. The following experiment should cause those who are indifferent to such matters to be more thoughtful. "A living fly was introduced into 500 cubic centimeters (about 16 ounces) of sterile milk. The milk was shaken one minute, when it was found to contain 42 bacteria per cubic centimeter (about 15 drops). After twenty-four hours at room temperature, it contained 765,000 bacteria per cubic centimeter, and after twenty-six hours, 5,675,000."

(8) *Other Sources of Contamination.* Dirt, bits of hay, hair, all foreign particles, whether filth from the stable, pieces of sawdust, or what not, are sources of contamination.

The Quality of Milk is supposed to be

regulated by law in most States, the standard calling for 12 per cent. of total solids and 3 per cent. of fat. Of course the consumer has no way of testing the milk, either with reference to the richness or the purity, and the most that one can do in this regard is to purchase the supply from a reliable source.

"Grocery Milk," milk which stands, generally in open cans, in the grocery store, and which is dished out into buckets and bottles for the purchasers, is a most fruitful source of disease. Not only is the milk not up to the required standard of composition, but it is seldom fresh when it reaches the consumer, is teeming with millions of germs, and the first served gets the cream, if there is any.

Bottled Milk is the next grade to "grocery milk." This is said to be bottled at the dairy and shipped to the market ready for use, reaching the consumer in the original container. In many instances the dairies take every precaution to furnish milk as free as possible from dirt and bacteria, and if it is necessary to use bottled milk, the consumer should be careful to demand the product of such careful and trustworthy dairies.

Inspected Milk.—This term is applied in some localities to clean raw milk from cows pronounced healthy after the "tuberculin test" has been applied and a physical examination made by a qualified veterinary surgeon. It is also to be understood that the cows are fed, watered, housed, and milked under good conditions, that the milk is delivered in sterilized containers, that it is kept at a temperature not exceeding 50° F. until it reaches the consumer, and that it contains not more than 100,000 bacteria per cubic centimeter.

Certified Milk is the best grade of bottled milk. This is milk which conforms to a certain standard of composition and bacterial content, the quality being determined by the "milk commission" of the given locality. If a dairyman furnishes milk which conforms to the standard demanded by the Commission, a label is furnished him which certifies this fact.

But the production of a clean, safe milk is expensive, and the vast majority of people are unable to pay the price demanded. Various attempts have been made to obviate this difficulty, with only a limited measure of success.

Straus Pasteurized Milk is of good grade, subjected to the process of pasteurization in order to destroy the disease-producing germs. It is reasonable in price, but unfortunately it is available for only a limited part of the infant population of New York and other cities where it is supplied.

White Cross Milk, a new candidate in the field, promises to solve some of the difficulties. This is an evaporated milk, the water being driven off by heating the milk for three hours to a temperature of 140° F., while a current of purified air is passed through it. In this way the milk is pasteurized, its digestibility unimpaired, and the pathogenic germs destroyed. The bulk of the milk is thus greatly decreased, and many of the problems of transportation solved. By the addition of water at the time of using, a good pure milk is available at no greater expense than ordinary milk. The water, of course, should be clean. If one of the many pure spring waters is used, very well; otherwise, the water should be sterilized by boiling and setting aside to cool in a clean, covered vessel. This form of milk seems to be rapidly growing in favor.

With State and municipal inspection of the sources of supply, and with the greatly improved facilities for obtaining pure, rich milk, free, or approximately so, from disease-producing germs, great improvements have been made in the artificial feeding of infants. But a clean milk supply avails little if the mother or caretaker of the infant does not know how to keep it clean.

Under no circumstances should milk be left standing uncovered to catch the germ-laden dust which is always present. It should be placed in vessels which have been freshly scalded, and all the appliances,—nipples, nursing bottles, etc., employed in infant feeding,—must be absolutely clean.

Should the milk be obtained from a source which is at all doubtful, it should be sterilized before being used. This is accomplished by various methods.

Sterilization.—By sterilization, as the term is commonly interpreted, is meant the heating of milk or other fluid to the boiling-point, 212° F., keeping it at this temperature for twenty minutes. This destroys the disease-producing germs, but it will not destroy the more resistant spores or germ-seeds, some of which are not killed by five to ten hours of boiling. Sterilization and rapid cooling will kill the existing bacteria and will thus prevent, for a time, the further development of these micro-organisms. But the heating of milk to this high temperature changes its character so as to render it less suitable to the needs of the young infant.

Fractional Sterilization.—A method which is preferable to the above is the following:

(1) Bring the milk to just below the boiling-point in order to kill the fully developed germs. (2) Set aside in a cool place, in a covered vessel, for one, two, three or more hours, to allow the spores (germ-seeds) to

develop. (3) Bring once more to just below the boiling-point in order to kill the second growth of germs. (4) Set aside to cool again. (5) Heat once more as directed.

Pasteurization.—This method of rendering milk germ-free is so-called after Louis Pasteur, one of the founders of modern bacteriology. It consists in bringing the milk to a temperature of 140°-167° Fahrenheit (some prefer a higher temperature, but still below the boiling-point), maintaining it at this temperature for twenty minutes in a closed vessel, then cooling it rapidly. The rapid cooling of the milk is important. If heated milk is allowed to cool slowly it remains for a long time at a temperature which favors the development of bacteria. Under such conditions enormous numbers of bacteria will develop in a few hours. The lower temperature is less likely to destroy the chemical ferments (enzymes) which are supposed to be of great value in increasing the digestibility of the milk. The flavor, by this process, is not destroyed, the food value remains the same, and yet the degree of heat is sufficient to destroy germs of such diseases as tuberculosis, typhoid fever, scarlet fever, diphtheria, dysentery, cholera, etc., which are most to be feared from milk.

Some have urged against pasteurization, the danger of "rickets" or scurvy. When these occur in a child fed on pasteurized milk, they are thought by others to be due, not to pasteurization, but to improper hygiene, defective composition of the milk, or some other cause.

Modified Milk.—The simplest method of artificial feeding of infants is that to which the vast majority of mothers will resort. Many formulæ have been devised for this purpose, but we give below that which Dr. Kerley, in his Out-patient service of the New York Babies' Hospital, has found satisfactory.

"*Bottle-feeding:* The bottle should be thoroughly cleansed with borax and hot water (one tablespoonful of borax to a pint of water) and boiled before using. The nipple should be turned inside out, scrubbed with a brush, using hot borax water. The brush should be used for no other purpose. The bottle and nipple should be placed in a covered vessel in plain boiled water until wanted. Never use grocery milk. Use only bottled milk which is delivered every morning. From May first to October first the milk should be boiled five minutes immediately after receiving.* Children of the same age vary greatly as to the strength and amount of food required. A mixture, when prepared, should be put in a covered glass fruit-jar and kept on the ice. For the average baby the following mixtures will be found useful:

"*For a child under six weeks of age*: Nine ounces of milk, twenty-seven ounces of barley-water, four teaspoonfuls of granulated sugar. Feed from two to three ounces at two and one-quarter hour intervals, nine feedings in twenty-four hours.

"*Sixth to twelfth week*: Twelve ounces milk, twenty-four ounces barley-water, five teaspoonfuls sugar. Feed from three to four ounces at each feeding.

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* Fractional sterilization as described is preferable.

"*Third to the sixth month*: Eighteen ounces of milk, thirty ounces of barley-water, six teaspoonfuls of sugar. Feed four to six ounces at three-hour intervals, seven feedings in twenty-four hours.

"*Sixth to the ninth month*: Twenty-four ounces milk, twenty-four ounces barley-water, six teaspoonfuls granulated sugar. Feed six to eight ounces at three-hour intervals, six feedings in twenty-four hours.

"*Ninth to twelfth month*: Thirty-eight ounces milk, twelve ounces barley-water, six teaspoonfuls of granulated sugar. Feed seven to nine ounces at three and one-half-hour intervals, five feedings in twenty-four hours."

The barley-water used for diluting the milk is made in the following manner: One rounded tablespoonful of some good barley flour; one pint of water. Boil thirty minutes; strain; add water to make one pint.

The high infant mortality in the large cities is chiefly attributable to incorrect feeding, particularly during the summer months. The infant's intestinal canal is more susceptible to bacterial invasion than is that of the adult, and the little one's powers of resistance are less; and when the food is improperly prepared, impure, or given in too large quantities, or when it is unsuited to the digestive powers of the infant, it undergoes decomposition and putrefaction instead of digestion and assimilation. Gastro-intestinal diseases, "rickets," anemia, and the various infectious diseases are common results of the improper feeding of infants. The poorly nourished child has not sufficient resisting power to overcome the invading army of disease-producing bacteria, and almost inevitably yields to one form or another of these microscopic enemies to health. Too much thought and care, therefore, cannot be given to the selection and preparation of the infant's nourishment.

Crying.—While the infant cry is significant, it is often misinterpreted. The old "black mammy" idea that the cry without tears is not the cry of pain, is fallacious and harmful. It cannot be true, for the reason that the infant sheds no tears for the first two months and more after birth, the lachrymal apparatus, which supplies the tears, being undeveloped. It is harmful, because during this time the infant, with "no language but a cry," may suffer pain and discomfort which is unheeded, because of the careless interpretation of the cry. Dr. Cotton, whose experience is long and varied, says that there is no such thing as a meaningless cry—it is only a question of interpretation. Dr. Kerley, a specialist in the diseases of children, on the other hand, warns against attaching undue significance to so-called characteristic cries.

The discomforts of its new surroundings call forth the infant's first cry, which is lusty or weak according to the little one's initial vitality. The crying necessitates deep breathing, which expands the lungs and more fully establishes respiration, and makes possible the oxygenation of the blood. Without this, normal respiration would not be effected, and the infant who never cries is likely soon to leave this world. Crying also gives rise to muscular movements, which involve the greater part of the body, thus furnishing exercise, and it increases peristalsis, by which the alimentary tract is cleared. Fear, hunger, uncomfortable clothing, heat, cold, and anger may cause the healthy infant to cry. It may also cry from habit. The over-indulgent mother who feeds the infant as soon as it begins to fret, or who coddles, rocks or bounces it, may very quickly establish in it the crying habit, which is hard to overcome. This must be guarded against. The healthy, properly managed baby gives little trouble of any kind.

Persistent crying should always be heeded. Earache, colic, and various other ailments requiring attention, may give rise to crying, persistent or paroxysmal, and should not be overlooked.

Sleep.—During the first few days of the infant's life it should sleep continuously except when being fed or otherwise attended, and during the first three months or so it should sleep from twenty to twenty-two hours out of the twenty-four. From six months to six years of age the child ought to sleep twelve hours at night, with morning and afternoon naps of two hours and less, according to the age. Disturbed or broken sleep signifies bad habits, improper food, digestive disturbances, or some form of illness. Sleep forms a very important part of the infant's "work," and should not be interfered with, nor should irregularity in this regard be allowed.

The Infant Not a Plaything.—"An infant during the first year should neither be amusing nor amused," is an excellent rule to follow. The baby should not be unnecessarily handled, and the antics so often indulged in by the attendant for the purpose of eliciting the coo or the smile are a needless tax upon the little one's vitality. Repose and quiet are most important at this time. The young infant is in almost constant motion during its waking hours, which gives it the necessary muscular development. Froebel's "Play with the Limbs," which is supposed to be "a real educational exercise," seems to be a premature application of the kindergarten idea. According to its advocates it is to be commenced as early as the fourth week, and consists of holding the ankles and resisting the natural baby impulse to kick, sometimes letting the little one push against the attendant's hand or chest, while the latter sings and laughs. "By means of it the child may gain some consciousness of companionship, and thus, by contrast, a deeper self-consciousness," says one writer!

The infant at this stage needs no "consciousness of companionship." The development of "self-consciousness," or the attempt to develop it in a tiny infant, would doubtless be an interesting experiment were it not a needless imposition upon the little one's undeveloped but rapidly growing brain. However, this is an academic rather than a practical question, and only the most "advanced" mother, we fancy, would indulge in such experimentation.

The temptation to have the baby constantly in the arms during its waking hours should not be indulged. The vertebræ and vertebral ligaments are not sufficiently developed during the early months to support the head and trunk, and the practice of making the little one sit upright on the knee or in the arms, without proper support, may lead to spinal curvature.

Along with the pernicious practice of coddling and bouncing the infant, to which allusion has been made, may be mentioned the far more harmful custom of the promiscuous kissing of the defenceless infant. This should never be allowed, particularly kissing the delicate lips, as germs of tuberculosis, diphtheria, and various other diseases, may be transmitted, even from the lips of perfectly healthy individuals. This is not difficult to understand when we recall the number of disease-producing germs which the mouth harbors.

Clothing.—Great advances have been made in the matter of healthful clothing for infants. Simplicity and comfort are the basic ideas in the evolution of infant apparel, and simple garments of soft material have replaced the formidable long, much-trimmed affairs of some years ago. The idea now is to clothe the infant in garments which give evenness of pressure, uniformity of temperature, absence of bands and pins, lightness of weight, and easy adjustability—important elements of correct clothing at any age.

Teething.—The temporary or "milk teeth" begin to develop before the child is born, and at birth the incisors (front teeth) and the canines ("dog teeth") are fairly well formed beneath the gum-margin. There are twenty of this first set of teeth, and the order of eruption, which is fairly constant, is as follows:

Lower central incisors (2)	6th to 9th mo.
Upper incisors (4)	8th to 10th mo.
Lower lateral incisors (2)	15th to 21st mo.
First molars (4)	15th to 21st mo.
Canines (4)	16th to 20th mo.
Second molars (4)	20th to 30th mo.

As soon as the teeth begin to appear the mouth should be washed out twice a day with a solution of boric acid (two even teaspoonfuls to a pint of water) or plain boiled water. This can be accomplished by means of absorbent cotton or a piece of very fine linen or soft gauze wound around the tip of the index finger, which is then dipped in the solution and applied with gentle friction to the teeth and gums, care being taken not to abrade the latter. During and after the second year a soft tooth-brush may be used, with some simple tooth-powder or wash.

It is a mistake to consider decay of the milk teeth as a necessary evil. On the contrary, every child over two years of age should be examined by a competent dentist, and cavities filled with soft filling. The milk teeth are properly lost, not through decay, but by the absorption of the roots and the pushing out of the crowns by the permanent teeth.

Dentition, being coincidental with the transitional period of development, is given undue importance in the minds of mothers as the cause of all manner of disturbances,—"teething fits," "teething diarrhea," "teething fever," "teething colic," etc.,—whereas, as a matter of fact, the healthy, normal infant suffers little inconvenience in consequence of the eruption of teeth. In the "rickety," anemic, ill-nourished infant, on the contrary, in whom dentition is generally delayed, digestive disorders, restlessness, irritability, and, perhaps, a degree or two of fever, are not of infrequent occurrence, and if not checked, may lead to grave intestinal disease.

Thumb-Sucking.—This early-acquired and hard-to-break habit results in thickened lips, projection of the upper incisor teeth, and angular deformity of the upper jaw. This projection and deformity in time become so marked that the mouth is practically never closed, and thus various important functions are interfered with, as will be seen when we discuss mouth-breathing. This bad habit should be corrected in its incipiency by having the child wear a glove or mitten of linen or muslin, or by applying to the fingers some bitter drug, such as tincture of aloes. The use of the "pacifier," or rubber nipple, is also productive of deformity of nose and teeth, and by constant sucking excites an unnatural flow of saliva and mucus, which goes into the stomach, with impairment of digestion. In addition, it produces a habit which in itself is bad, and leads to the introduction of dirt and germs.

Bathing.—The temperature of the bath for the very young infant should never be below 95° nor much above 100° Fahrenheit. Two or three minutes in the water is quite long enough. The temperature of the bath may be gradually reduced as the child grows, so that at six months it may be 90°, and by the end of the first year, 85° to 90° F.

The temperature of the room in which the bath is given should be from 76° to 80° F., with careful avoidance of any draught.

The duration and frequency of the bath depend entirely upon the reaction of the infant. If the skin is blue or chilly, or if the child shows signs of exhaustion, the bathing is too frequent or too prolonged. Little soap is necessary, and the use of a soft cloth is preferable to that of a sponge.

A tepid sponge bath is cooling and soothing in hot weather, and is generally conducive to restful sleep.

A brine bath (an even tablespoonful of salt to a gallon of water), given for from five to ten minutes, has a tonic action and is especially beneficial to delicate and poorly nourished children.

A soda bath (one tablespoonful of bicarbonate of soda to each half-gallon of water), or a bran bath (one cup of bran in a tub of water), is of service in cases of prickly heat. The water should be of the temperature to which the child is accustomed, and the duration of the bath from two to four minutes.

Fresh Air.—Fresh air, oxygen-laden, is just as essential to the well-being of the infant as to that of the adult. When the weather is good, and when it is possible to protect it from the sun and wind, it is most wise to keep the child in the open air the greater portion of the day. If this is not practicable, the requisite fresh air should be secured indoors, by having the windows on one side of the room open wide, care being taken to avoid draughts.

A well-known writer has lately advocated the ticketing of baby carriages, with a number hung in a conspicuous place, as is required on all automobiles. This plan, with its license book, giving name and address, would serve as a check to indifferent and careless nursemaids. A note or letter directed to the number of the baby carriage, care of Department of Licenses, would give the sensitive and conscientious on-looker a method of communicating with the baby's mother without arousing her distrust and suspicion of "interference."

The newspaper joke of "Mary Jane and the Policeman" enjoying a flirtation, while the baby looks on in distress and discomfort, has about it more of truth than poetry, if one is to judge by daily observations in our parks and streets. The nurse chooses the busiest streets through which to pass to the park. In the park she selects a comfortable seat where there is plenty going on to interest her. Baby carriages are to be seen thickest along the drives where the babies sleep amid noise and dirt, often with the sun beating down on their little helpless upturned faces, and where the air they breathe is full of dust and the fumes of gasolene.

The chief injury to the child at this age is not that of broken bones or of visible bruises,—these would provoke investigation and thus be a further protection in themselves,—but rather to the general health, to the nervous system, through needless infection, irritation, unkindness and unnecessary prohibitions and neglect.

The Nursery should have a southern exposure, if possible, and be so situated that plenty of air and sunlight are available. The temperature of the nursery during the day should be 66° to 68° F., never above 70° F. At night, during the first two or three months of the child's life, the temperature should not be below 65° F. After the third month it may go as low as 55° F., and after the first year as low as 45° or 50° F. After the third month a window may be left open at night. Under no circumstances should an infant be kept in a close, stuffy, ill-ventilated room.

THE SECOND SUMMER

The current belief that dentition gives

rise to the various ills which so frequently appear during the second, or "teething summer," has caused this to be regarded as the most critical period in the child's life. Some infants who have been strong and healthy up to this time have their digestion so seriously deranged by improper feeding that sickness inevitably follows. With the appearance of the teeth the child's bill of fare is extended, it is given food that is too starchy, possibly meat, or candies, cakes and other knick-knacks, which overtax the digestive apparatus, giving rise to fermentative and putrefactive changes in the intestines. For these reasons the second summer is rendered an especially critical period, with great mortality, but this fact cannot rightly be attributed wholly to dentition. Proper diet, fresh air and hygiene should carry the average child safely through this period.

Part III

MORNING

“ Thou hast no heavy thought or dream
To cloud thy fearless eye;
Long be it thus—life’s early stream
Should still reflect the sky.”

CHAPTER VII

CHILDHOOD

WITH the first dentition complete, and the ability to walk and talk partially established, infancy ends and childhood begins. This second important division of the life cycle extends from about the end of the second to the twelfth year, or from infancy to adolescence. It includes the "kindergarten age" (from three to six or seven), and the age (from eight to twelve) variously called the "irresponsible," "awkward," "lazy," "savage," age. Throughout this entire period, the morning of life, the child should be safeguarded in every possible way.

By this it is not to be inferred that a hothouse régime is advocated. The child who lives in the country (as every child should have the glorious privilege of doing), who is allowed to run and romp and climb, and practically live in the open, needs little more than the care required by the common-sense rules of hygiene, plus wholesome diet and plenty of sleep.

With the city or even village child the conditions are so different that many more details of diet, hygiene, exercise, etc., must be considered. Lacking the wholesome life in the open which the country child enjoys, various expedients are necessary in order to compensate for this loss. To this we shall refer later.

Second Dentition.—Perhaps the most important event of childhood is the appearance of a nearly complete set of teeth. It is the duty of parents to see that the permanent teeth are regular and of proper number, calling into requisition the art of prosthetic dentistry should this be necessary.

The permanent teeth, thirty-two in number, appear in the following order:

First molars	6th year
Central incisors	7th year
Lateral incisors	8th year
First bicuspids	10th year

Second bicuspids	11th year
Canines	12th to 13th year
Second molars	12th to 15th year
Third molars or wisdom teeth	17th to 25th year

What has already been said with reference to the evil effects of thumb-sucking applies during the second dentition with equal or greater force. If, for any reason, there exists what the dentists call malocclusion (when the teeth of one jaw do not come in contact with the teeth of the other jaw at the proper points upon closure of the mouth), it should be corrected by removal of the cause and by such correctional measures as the dentist may suggest. The science and art of dentistry have been so developed that all manner of dental deformities, as a rule, can be corrected.

Decaying teeth are prolific soil for the multiplication of bacteria, which, passing into the stomach, or lymph glands of the neck, may do serious harm. A cavity means decay, and should be the signal for consulting the dentist.

The child should be early taught the use of the tooth-brush and the proper cleansing of the mouth and teeth, the invariable rule being established of brushing the teeth after each meal and before retiring at night.

A brush of moderate stiffness should be employed, first in a general way, high up on the gums, lengthwise of the jaws, to remove large particles. The brush is next used with a rolling or circular motion, in order to remove all particles of food which have lodged in the grooves and spaces, after which the mouth and brush should again be thoroughly rinsed with water. The inner surfaces of the teeth must also be carefully brushed. Tooth-powder, paste, or wash, recommended by dentist or physician, should, as a rule, be employed once a day.

Correct habits formed in childhood will continue through life, and will do much toward the preservation of these important organs of mastication. The mouth, the port of entry to the alimentary canal, will thus be kept free from decaying, germ-laden material, which otherwise would find its way into the stomach and intestines, where poisonous products may be elaborated, which may pass into the blood, thus exerting their deleterious effects upon the entire system. The neglect of the teeth is no small matter.

Mouth-breathing.—Mouth-breathing is always a danger-signal which should not be ignored. It may be due to malocclusion of the teeth, as we have seen, to enlarged tonsils or adenoids, to obstruction of the nostrils by deflected septum or other abnormal conditions within the nose, or to severe cold and temporary blocking of the upper air passages. Whatever the cause, if long continued it leads to a train of troublesome results. In the first place, the function possessed by the nasal cavities of warming, filtering and moistening the air which is breathed is interfered with, the lymphoid tissue in the vault of the naso-pharynx does not exercise its supposed function in relation to the germs in the inspired air, and the blood is not properly oxygenated. So-called chronic cold, constant clearing of the throat, cough, snoring at night, stupid expression, and disturbed articulation, are some of the results of this practice. Whatever the cause, prompt efforts should be made for its removal.

The Nose.—We have just referred to some of the evil consequences of nasal obstruction. A vicious circle is established thereby. Mouth-breathing, one of the direct results of obstructed nasal respiration, leads to various abnormal conditions; these, in turn, render the child more susceptible to colds, and various other infections; the obstruction is thus continued, and, if not removed by hygienic, medical or surgical measures, almost surely results in some permanent impairment of health.

"Adenoids" (a term commonly employed to signify hypertrophy of the mucous glands situated in the vault of the naso-pharynx) may occur at any age, but are most common from two to six. The symptoms caused by hypertrophy of the adenoid tissue in this region vary in severity according to the amount of enlargement, but their existence should indicate to the parent the need of medical advice. "Chronic cold," with nasal discharge, persistent cough, usually worse when the child is lying down, mouth-breathing, the "adenoid face," peculiar speech, in severe cases deafness, etc., are danger-signals.

Enlarged adenoids, blocking the way for the passage of air to the middle ear, cause earache and partial deafness, and may lead to chronic aural disease and total loss of hearing. Furthermore, in a certain percentage of cases adenoids show tubercle bacilli, the germs of consumption.

There is a more or less wide-spread belief among the public at large that removal of adenoids and tonsils has an injurious effect upon the voice, both for speaking and for singing, and that it results in permanent impairment of the general health. On the contrary, failure to remove them when enlarged or diseased is far more apt to give rise to these evil consequences. It has also been urged that the operation itself is dangerous. In unskilled hands this is true to a certain extent, but with an experienced operator, and with proper subsequent care, the child should not only suffer none of the consequences mentioned, but ought to be definitely benefited.

The Throat.—The nose and throat are intimately associated in the matter of obstruction to normal breathing. Enlarged tonsils, like hypertrophied adenoids, may give rise to mouth-breathing, disturbance of speech, and deafness, and, because of the various disease-producing germs harbored in their crypts, they render the child more susceptible to certain diseases, notably diphtheria and tuberculosis. They may also be a contributory cause of "night terrors." Children with a predisposition to rheumatism are very apt to have enlarged tonsils. Hypertrophied tonsils should be removed, particularly on account of the obstruction to respiration, and because of their proclivity for harboring disease-producing micro-organisms.

The Eyes.—The rapid increase of defects of vision, as shown in recent school reports, and by the increasingly large number of children wearing spectacles, indicates the necessity for more careful attention to the hygiene of these important organs.

No inflammation or other abnormal condition of the eyes ought to be neglected. It is better to seek competent advice than to apply domestic remedies at random.

It is important to protect the child's eyes from any undue strain. When reading or studying, there should be ample illumination, the light being so placed as to fall over the left shoulder. Reading small or imperfect print, reading or writing in a faulty position, or when fatigued, is injurious. The book should be held at the proper distance from the eyes (according to the strength of vision in the individual case, the average being about twelve inches), and at such angle as will cause no strain. The book should be brought to the eyes and not the eyes to the book.

Eye-strain.—Weariness of the eye from over-use, or from uncorrected defects of vision (errors of refraction), gives rise to headache, various nervous manifestations, particularly St. Vitus' Dance, digestive disturbances, asthma, irritability of temper, lack of concentration, and mental dullness. Persistent headache, that cannot be traced to other causes, is often the only evidence of ocular defects, and demands the attention of a competent oculist.

Cinders, particles of grit, eyelashes, and other foreign bodies may lodge in the eye, giving slight or serious trouble, according to their location. They may be found on the upper or lower lid, on the sclera (the white portion of the eye-ball), or upon the cornea (the transparent portion which covers the pupil or "sight").

If the person in whose eye the particle is lodged can see it on looking out into space, it is on the cornea and must not be tampered with. Only one skilled in such matters should be allowed to try to remove the particle.

The sclera is next examined, the lids being widely separated by the fingers. If the object is not embedded in the eye-ball, it can be removed by means of a piece of clean cloth or cotton. Otherwise it may be necessary to seek competent assistance.

The under lid is examined next by pulling it down with the fingers, while the eye is looking toward the ceiling. The particle, if lodged on its inner surface, is easily detected, and may be removed by means of cloth or cotton.

Sometimes a particle on the upper lid may be brushed down by pulling the upper lid out and down over the under, looking up, and allowing the lashes of the under lid to sweep the inner surface of the upper. If this fails, the upper lid is everted by rolling it over a pencil or a toothpick wound with gauze or cotton, and the particle removed as above indicated.

The eye should always be rubbed from the outer toward the inner angle, whether this be for purposes of preliminary cleansing, or in the effort to remove the foreign body.

The old-time means of placing a flax-seed under the lid at the outer angle may prove efficacious. The lids are gently manipulated, so that the seed travels over the surface of the eye-ball. The particle will sometimes adhere to the mucilaginous surface of the seed and can thus be removed.

The Ears.—We have already seen that obstructions to respiration by enlarged tonsils and adenoids may give rise to earache, chronic ear disease, and partial or total deafness. Many children suffer intensely with earache, which is a symptom and not a disease. This should always lead to consultation with a physician for the purpose of finding and removing the underlying cause.

The number of household remedies employed for earache is almost legion. The juice of a hot roasted onion, hot sweet oil, laudanum, tobacco juice, and many other things, are dropped into the ear to relieve the pain. The "black mammies" of the South believed in the sovereign power of the single drop of blood which may be obtained by pulling the head from the body of the "Betsy bug" (a large black beetle), and dropping it into the affected ear. None of these reach the underlying cause, and if effectual at all, they are so by virtue of being heated. The same result is obtained by hot poultices, hot sand-bags, bags filled with hot salt, or hot water-bottles, applied to the ear. Temporary relief may be obtained by dropping into the ear a few drops of warm boracic acid solution.

Ear-wax which accumulates around the external opening of the auditory canal may be removed by means of a probe or toothpick around the end of which is securely wrapped a small piece of absorbent cotton. Pins, hairpins, and sharp or hard instruments, should never be used for this purpose. The deeper portions of the canal should not be tampered with by the novice. Impacted wax may give rise to serious discomfort, but necessitates the services of a physician for its removal. This applies also to beans, buttons, etc., which children will sometimes put into the ears.

The old-time practice, now fortunately almost obsolete, of boxing the ears as a form of correction, is most injurious. Aside from the ethical question involved, it is harmful because of the danger of rupturing the drum-membrane, and, perhaps, of permanently affecting the hearing.

Posture.—Correct posture at school, at home, and at play, is very important for the growing boy and girl, especially the latter. A deformed pelvis, with displacement of the organs, causing trouble in after life, may have its beginning in an incorrect way of standing or sitting.

Dr. Eliza M. Mosher, of Brooklyn, who formerly held high positions at Vassar College and the University of Michigan, in a series of excellent papers upon the influence of habitual posture, calls attention to the harmful effects upon the symmetry of the body and the health of the individual by incorrect postural habits. She gives the three fundamental positions which the body assumes in standing as follows:

(1) With both extremities evenly placed beneath the pelvis. (2) With one leg thrown forward, as in the attitude of walking. (3) With one leg thrown outward. The

head should be held erect and the spine straight.

"Those postures which limit chest expansion," says Dr. Mosher, "which curve the spine abnormally, which displace the viscera and distort the features, cannot be otherwise than harmful in themselves, although the body is long-suffering, and, if allowed sufficient time, adapts itself as far as possible to unhealthful conditions.

"The shape of the body in the sitting posture is greatly dependent upon the position of the arms and head. The one which best maintains the symmetry of the trunk, and, therefore, is most healthful, is that in which the spinal column balances upon the pelvis with the arms at the sides and the head upright. This posture is the one which the body should be trained to assume in the schoolroom, the workshop and the carriage."

Attention is also called by the same authority to the importance of such chairs and other seats as will help the body to maintain itself in symmetrical postures. This is particularly important during the formative period of childhood.

Corrective exercises should be given to school children at stated intervals during the day, with the "definite object in view of preventing loss of symmetry and deterioration of health."

Diet.—The diet of the growing child is of the utmost importance. It should be highly nutritious, digestible, assimilable, and appetizing, and should be given at regular intervals. Plenty of time should be allowed for meals, and the child taught to eat slowly and to masticate the food thoroughly. Children too often, at home and at school, hastily swallow their food, take no time for mastication, and rush out for a longer time at play. This is not as it should be. Neither vigorous work nor play immediately following a meal is allowable, for the organs of digestion need the surplus blood for the work which they have to perform. Light games may be indulged in without harm, but romping, running, and such games as test the physical strength, should not be allowed immediately after meals. The school curriculum ought to be so arranged that the most difficult lessons do not come at a time when the blood is needed for digestion.

The constant munching of knick-knacks and candies between meals is pernicious. It overtaxes the digestive apparatus, deranges the appetite, and is very prone to lead to digestive disturbances, malnutrition, pallor, anemia, and a general weakening of the system which renders the child susceptible to changes of temperature, to "colds," and to other acute infectious diseases.

Parents are ofttimes careless in the matter of school lunches for their children, sending them off with whatever happens to be available rather than providing something that is nutritious, or, at least, not injurious. In many schools opportunity is now given the pupils at noon to buy, at moderate cost, a cup of hot, nourishing soup, a sandwich, and fruit. This is certainly better than the lunch of pickles and pie, candy and cake, with which so many children are provided.

Fuel-foods.—The foods necessary for the burning or oxidation process within the body are carbohydrates (sugars and starches) and fats. They produce body heat and energy, and are necessary for the growing child who is active and vigorous, and who is constantly expending a large amount of physical energy.

Tissue-building Foods.—Proteid foods (meat, fish, eggs, certain constituents of milk, and vegetables to some extent) are those that repair the waste caused by the wear and tear of manual labor and the more active modes of existence. Children and young adults who have not attained their full physical development, whose lives, by virtue of their activity, entail great tissue-waste, need a fair proportion of proteid diet.

Starch Indigestion.—Many children, as well as adults, are by nature unable to digest large quantities of starch, *e.g.*, bread, cereals, potatoes. This is due to the deficiency of certain internal secretions which aid in the digestion of this class of foods. The child's diet should be regulated accordingly if this deficiency is suspected.

Fats.—While everyone needs a certain

amount of fat for health and strength, children need it for growth and development, and for beauty. The place of fat in daily diet is everywhere being better understood. Even the "beauty doctors" know that stored-up fat in the body has a cosmetic value, and the nerve-specialist fully appreciates its importance as padding for nerves and vital organs. It helps to keep the internal organs in place, and to relieve strains and shocks. A goodly store of adipose tissue is a valuable asset for the ambitious boy or girl who is entering upon a college course. Such a person is comparable, in a measure, to the camel, being able, in physical emergencies, to literally "live on his own fat."

All fats are more palatable and easier to digest, as well as more attractive to children, when combined with some form of starch or sugar, as, for example, bread and butter, suet pudding, sandwiches, etc.

Bacon, cut thin and cooked crisply, can be eaten regularly and for a long time by those who find all other fats distasteful. This makes it a valuable dish for children.

Mixed Diet.—A nutritious mixed diet is best for the growing, healthy child. Such a diet may be selected from the following: milk; cream; butter; eggs (soft-boiled, poached or coddled); soups and broths (not too greasy); red meat, beef or lamb (roasted or broiled); poultry and fish; potatoes; green vegetables; stewed and raw fruits; cereals, such as oatmeal, cracked wheat, rice, cornmeal and hominy, all well cooked. Meat should be allowed only once a day, at the noon meal. The quantity may be gradually increased as the child approaches adolescence, but an excess of meat in the dietary of the child is especially harmful, tending to clog and over-stimulate the system.

Milk is rendered more indigestible by acids. It should, therefore, be taken sparingly, if at all, with raw or acid cooked fruits.

Water.—The infant usually receives the requisite amount of water in its milk, which contains, on an average, from 85 to 90 per cent. of water. As the child begins to take a diet of solid food it becomes necessary for it to drink larger quantities of water, which is needed not only for the purpose of dissolving the food elements, but also to supply the rapidly growing tissues. It removes the accumulation of decomposition products, and also causes increased digestion and assimilation of proteid foods. Green vegetables and fresh fruits contain a large amount of water, but in addition to this the child should drink freely between meals. The food should never be washed down with large quantities of fluids. Drinking ice water or other ice-cold fluids is harmful, especially when one is overheated.

Tea and Coffee are not to be included in the dietary of the properly conducted nursery. They over-stimulate the developing brain and nervous system, rendering the child restless and wakeful.

Anxiety at mealtimes must be avoided. Experiments have proved that worry and fear will prevent digestion. A scientist tested this by shutting two hungry dogs in a room with a whip on the table, just before feeding them. One dog had never seen a whip; all its life it had been treated kindly. The other animal had had a cruel master. The first dog ate its food quietly, while the second trembled and quivered as he saw the lash near by. A few hours after the meal had been eaten it was found that the food of the happy and fearless animal had been well digested, while with the other dog no digestion had taken place. The moral is plain. Let the mealtime be one of the happiest in the day. It should never be taken for correcting or punishing a child. A happy and contented mind is a great aid to digestion.

The "Sugar Vice."—The excessive consumption of candies and other sweets by children is distinctly detrimental to health. "Growing pains," rheumatism in various forms, St. Vitus' Dance, enlarged adenoids and tonsils, "bowel complaint," impaired appetite for more substantial diet, malnutrition, anemia, susceptibility to colds and other infectious diseases, may be the result of this "sweet habit."

"Growing Pains."—These indefinite muscle-pains, so frequent in children, are manifestations of rheumatism. They should not be carelessly considered, but should be regarded as danger-signals. They may be the beginning of serious affections of the heart or kidneys. They result from what is known as the "rheumatic diathesis,"—an inherited rheumatic tendency,—from the habitual consumption of excessive amounts of sweets (sugar in any form), and from the eating of larger quantities of red meats than the digestive apparatus can manage. If the regulation of the diet does not give relief the family physician should be consulted.

St. Vitus' Dance (*Chorea and Choreic Movements*) usually occurs between the ages of five and fifteen, though it may occur at any age. It is more common in girls than in boys, and in city than in country children. The "sugar vice," as we have seen, too rich diet, nasal obstruction, eye-strain and errors of refraction, over-study, worry, fright, scarlatina and other eruptive fevers, are among the causes.

The involuntary tendency to imitate the actions and manners of others will often cause a child who is associated with a sufferer from chorea to form the habit of making these nervous movements.

Abnormal Tendencies.—Even among very young children abnormal tendencies may manifest themselves. These should be corrected early, or they will surely add to the difficulties of right living on the part of the developing boy or girl, and become fixed into habits that will be continued into manhood and womanhood.

Many times these evil tendencies are engendered and fostered by household servants and ignorant nursemaids, and the relations of these individuals to the child must be carefully considered. Credentials are demanded from prospective servants as to length of previous service and reasons for leaving the last place. Neatness in dress and respectful manners are considered important, but it is not usually the custom to look much deeper. The physical and moral health of the applicant should be taken into account.

Many a child entrusted to a carelessly selected servant may have to fight moral battles through a long series of years because of the teaching of evil lessons, of which the parents have no knowledge.

While this condition of affairs is, unfortunately, too often the case, it is but just to say that many a child has received wholesome training at the hands of faithful servants which the parents were incapable of imparting. The mother, with her social and other duties, and the father, through the press of business, often neglect the so-called small things in the child's daily life, and fortunate is the boy or girl when the failure of the parent is redeemed by the tender and watchful care of faithful attendants.

The truth of the old saying, "Give me the first nine years of a child's life and you may have the rest," is constantly being verified. The Earl of Shaftesbury, one of the greatest of the world's philanthropists, gave the credit of his strong bias toward the work of his life to the influence exerted in early childhood by his nursery governess.

The practice of allowing a child to spend the night with another away from the home should be allowed only under the most favorable circumstances. It may prove a prolific source of evil habit-forming.

Clothing.—Clothing should be of light weight and comfortable construction. It matters not whether wool, linen or cotton be worn next the skin, providing sensible perspiration (the functional excretion of sweat) on the one hand, and chilling of the surface of the body on the other, are avoided. Exercise to the point of sensible perspiration should always be followed, if possible, by a change of underwear. When this is impracticable, as when the child is at school, extra wraps should be worn for a time to prevent sudden chilling.

Tight clothing interferes with the proper circulation and with the development of the constricted parts. It is especially harmful for the neck and waist.

The feet ought always to be kept dry and warm, and tight, ill-fitting shoes should not be worn. The shoes should fit the individual's foot, regardless of preconceived notions as to what constitutes a "sensible" shoe. A child with a short, broad, flat foot should not wear a shoe with a long vamp and high arch. On the other hand, a slender, long foot, with a high arch, requires a shoe with a long vamp and a high arch. Shoes which do not properly fit the foot are conducive to the production of "flat-foot," a troublesome and painful condition.

CHAPTER VIII

THE IRRESPONSIBLE AGE

THERE is no period of the child's life which so taxes the patience of parent and teacher, and which calls for such intelligent oversight, as the years from eight to twelve or fifteen. With the various organs well along toward full development and only needing to increase in size and strength, with the health at its maximum, and with abundant activity and vitality, the child, especially the boy, begins to experience and to manifest a certain self-consciousness and sense of power that render him more or less independent of parental guardianship and guidance. He begins to feel, and does not hesitate to express, his ability to take care of himself. He resents what he considers unnecessary restraint and interference with his will. It is a time when "the boy's ways are the wind's ways, and his thoughts are long, long thoughts."

And yet, with it all, the child can now be controlled by an appeal to this new-born sense of power; being plastic, he is susceptible to discipline tactfully administered. The child is now really "father to the man." The versatility manifested at this period should be taken into account in the education of the child, particularly the boy, and his training directed along channels into which his talents and tastes naturally lead him. He should not be unduly hurried, for this has been called the lazy age, and the child resents being prodded. It is a part of his awakening consciousness to want to do things in his own way, and, instead of being thwarted in this and his "will broken," he should be intelligently guided and his own ingenuity tested and developed.

The natural tendency of the child of this so-called "lazy age" is to be dreamy, languid, more or less indifferent, and a creature of varying moods. But this has its limits, and the watchful parent or teacher should be able to discern an abnormal degree of what is commonly and wrongfully called laziness. This exaggerated abhorrence of haste may be a danger-signal of vital importance, indicating malassimilation of food, anemia, malaria, or, perhaps, some more serious disease, such as the incipient stage of typhoid fever, or tuberculosis.

Advanced school methods are taking the physical nature of the growing boy and girl more and more into account. The child who has no large fields in which to work off his surplus energy is provided with more playgrounds, gymnasiums, apparatus, etc. Motion songs, with schoolroom windows open wide, military drills, and exercises in deep breathing, at intervals during the school day, give a wholesome and restful change from the heavier studies.

In the home life there is need for great patience and ingenuity on the part of the older members of the household. Too often the growing, restless lad hears, "Don't, Don't," "Don't do this," or "Don't do that." Open up avenues for his energies at home; give him a good room, even though the occasional guest must take a less attractive one; give him a corner for tools and his own special treasures of fishhooks, marbles, and what not. Let him feel that his mother is his companion and his father his chum. If the home holds the boy through these transition years, he will hold to the home through later years.

Dr. G. Stanley Hall says of the boy of this transition period: "He is not depraved, but only in a savage or half-animal stage, although to a large-brained, large-hearted and truly parental soul that does not call what causes it inconvenience by opprobrious names, an altogether lovable and even fascinating stage. The more we know of boyhood the more narrow and often selfish do adult ideals of it appear. Something is amiss with the lad of ten who is very good, studious, industrious, thoughtful, altruistic, quiet, polite, respectful, obedient, gentlemanly, orderly, always in good toilet, docile to reason, who turns away from stories that reek with gore, prefers adult companionship to that of his mates, refuses all low associates, speaks standard English, or is as pious and deeply in love with religious services as the typical maiden teacher or the *à la mode* parent wishes. Such a boy is either under-vitalized and anemic and precocious by nature, a repressed, conventionalized manikin, a hypocrite, as some can become under pressure thus early in life, or else a genius of some kind with a little of all these."

It has been predicted that "with the development of the newer ideals of peace," when the "newer humanitarianism" is practiced, each nation will, in the process of nature, reach the point "when virile good-will will be substituted for the spirit of warfare." It is safe to predict that the beginning of this revolution may be found far below the Cabinet, the Reichstag, the Duma, and the various Peace Congresses—the foundations are laid in the cradle and during the growing years. The development of the spirit of kindliness, not only of child to child, but of parent to child and of child to parent, is fundamental—and by no means as universal as mothers of sweet-faced children are prone to think. Deeds of cruelty on the part of children may be witnessed in those who have themselves received little of kindness and much of brutality. These children must be reckoned with as an important part of the rank and file of the coming generation. It behooves adults, whose lot is cast under more favorable conditions, to do all in their power to inculcate a spirit of kindliness, gentleness and consideration in children in general, but particularly in those whose home training is deficient.

Those who have not had occasion to observe it would be appalled to see just how cruel boys and girls can be at times to each other, to old people, and particularly to animals. This spirit is the outcome of environment and the product of their own experience. In the make-up of every boy, however, there is an underlying sense of justice or fair-play, an appeal to which can often be effectually made in governing him.

Fear.—A pernicious and far-reaching evil in the control of children is fear. Many parents, through indolence, or through ignorance, attempt to control their children by inspiring fear—fear of the dark closet, fear of the "switch," fear of the slipper, fear of the "bogie man," and of all sorts and conditions of fear-inspiring creations which the idle and sluggish brains of some mothers seem capable of conjuring into an existence all too real so far as the child is concerned. Such discipline is most harmful, and many a nervous and physical wreck has resulted from this unwise method of control.

The child who is punished for the slightest indiscretion, who is scolded for this or that minor fault, who is whipped for offences which, to his untutored mind, are of little consequence, is not apt to be specially tolerant of the shortcomings of neighbors when he grows to man's estate, nor is he to be considered hopeful material for the weaving of the fabric of the mantle of peace which it is hoped the world may some day wear.

Modern education, however, is making progress in dealing wisely with children of this class. It is a significant fact, as reported by Homer Folks in his "Study of Delinquent Children," that in reformatory institutions discipline has more and more relaxed in severity. "Bolts, bars, and high walls are rapidly becoming things of the past. In 1898, of forty-three reformatories reported upon at the national conference of charities and corrections, thirteen were classed as 'walled' and thirty as 'open' institutions." "The problem," says Mr. Folks, "is seen to be more and more one of education, not of repression or even of reformation, as that term is ordinarily used. The evil tendencies are to be attacked indirectly by the introduction of new *interests,* new *ambitions,* and new *powers.*" And this applies as forcibly in the family as in the reformatory.

School.—The child who has the privilege of living the normal, natural, free life of the country loses nothing and perhaps gains much if he never crosses the threshhold of a schoolroom until he is eight or nine years of age. The keen eye and observant brain of the untrammeled child is storing away useful knowledge and experience with every day of freedom from restraint. More than all, he is accumulating abundance of vital resistance for the struggles and storms which the years are apt to bring. He is banking a surplus of physical, mental and moral wealth, upon which he may draw when the exigencies of life make the demand.

Many of the most distinguished figures in history could count on their fingers the number of months spent in school. In some instances the lack of schooling was the result of the lack of schools for them to attend, and in others it was due to poverty, which made it necessary for them to become bread-winners at a very early age.

At the present time, however, with the network of railroads, electric lines, free and public schools, few districts are so isolated but that the children have thrust upon them the "advantages of an education." They still have the woods to roam, the hills to climb, the birds to know and love, and the thousand and one interests which are unknown to the city child. Along with the acquisition of "book learning" the country and village child is able to "work off" the surplus vitality in a wholesome way, which means that Nature is carrying on an accurate debit and credit account for the child, who comes to adult life with a large balance on the credit side.

But how is it with the city child? The kindergarten, the grammar school, the high school, and, perhaps, the college or university, too often bring their quota of pale cheeks, over-wrought nerves, forced emotional natures—men and women who should still be boys and girls. The school life of every child is marked by danger-signals from the first day in the kindergarten to the graduation day from the university,—danger to eyes, to ears, to lungs, to nerves, to the whole physical organism. The wise parent and teacher heeds these danger-signals, regardless of honors in school. For what matters it how much of physics, chemistry, trigonometry, etc., the boy learns in school, if his brain is developed at the expense of his body and he leaves college a burden to himself and unfitted for the high calling of citizenship? And what matters it how well the girl plays the piano and "jabbers" French, or reads Greek and Latin, if the "finishing school" leaves her physically unfitted to be a home maker and unable to meet the sacred duty of motherhood?

When the schoolboy or schoolgirl, of whatever age, is losing appetite, flesh and strength, is irritable, morose, depressed, worried over lessons, sleepless, perhaps,—the danger-signals stand out clear and menacing upon the horizon of that child's life.

With schoolrooms well ventilated, properly lighted, adequately heated, with neutral tones upon the walls, with blackboards and books having unglazed surfaces, and with the necessary amount of proper food and of rest and recreation, the child may escape being made a physical and mental misfit by the "cram it in, slam it in" process which is so often synonymous with modern education.

Open-air Schools.—The "return to nature" tendency in modern education at the present moment is finding expression in some localities in open-air schools, some of which are suited to the needs of the healthy and wealthy, and others to the more or less defective and poor.

It is the aim of the former to give boys the full four-year training preparatory to college work, at the same time developing the purely physical side of life by outdoor sports, riding, swimming, gardening, etc. The pupils are made to care for their own rooms, take care of their own horses, and in many other ways learn to do for themselves.

In some localities the open-air school is being tried as an interesting experiment in the development of children who are unsatisfactory in one way or another. The curriculum is that of the ordinary school, with outdoor lessons, nature study, and intervals of rest and play. Three meals a day are given, and an hour's sleep in deck chairs. Physical exercise forms an important part of the routine. In one such school in England, after a year's trial, the children showed an improvement in general appearance and carriage, increased weight and chest measurement, and improved condition of the blood. The medical superintendent of this school, in his annual report, looked upon this class of school as a part of the great movement in preventive medicine. He believed it must necessarily lead to the greater efficiency of the individual, and, consequently, will make ample return to the community in this way for the additional cost of equipping and conducting such a school.

Fresh-air Recreation.—The necessity in the cities for teaching the children under cover is being more and more compensated for in many ways. For this purpose the city parks are being used more than formerly for children of all ages. A mother compelled to live in the city, whose little one was very delicate, employed a reliable woman to keep the child in the park, several blocks away, all day long. Better economize in other ways, if need be, and pay someone to keep the little ones out of doors at play. In many instances the parks are being utilized by the employment of young students, who are making their way through college, to act as companions to groups of restless lads several afternoons a week, after school hours. Money is well spent for such oversight and guidance in the city parks or in the country beyond the city limits.

A distinct advance in the right direction has also been made by the playground associations of the various cities. The playgrounds, by giving the children plenty of exercise and amusement in the open air, have lessened the proportion of sickness among them, and by affording to growing boys a wholesome outlet for their vitality the number of admissions to reformatories has been relatively lessened.

The streets of the city are full of peril, and as in so many instances there is no other place for the children to play, it is to be hoped that the good people who are devoting special study to the housing of the masses will make more use of the roofs for this purpose. Why not utilize roofs for gardens and games for the healthy as well as for the sick children of the community?

Rapid transit is helping to solve the problems of the parent who realizes the need of giving the children fresh air, and the working man who is compelled to live near his place of business can get out into the open with his family for at least a few hours a week.

The Fresh Air Work inaugurated many years ago by the late Willard Parsons—and his name should never be forgotten for this beneficent charity—has done more for the welfare of the city than can be reckoned by statistics.

Alcohol.—It has been shown that of 2891 juvenile idiots, epileptics, and weak-minded and hysterical children admitted to institutions for their care, 43.2 per cent. had drunken fathers; 3.6 per cent., drunken mothers; in 1.9 per cent. both parents were drunken, and in 51.3 per cent. the parents were abstainers. The statistics of Bleuler, of Zurich, show that 70 per cent. of epileptics admitted to a large asylum had an alcoholic heredity. Lunier claimed that 50 per cent. of the idiot and imbecile children of France had drunken parents.

It has been shown that in Norway, where the distillation of spirits was declared free in 1816, drunkenness subsequently greatly increased, and that in the years 1825-1835 this was followed by an increase in the number of idiots amounting to 150 per cent. Restrictions were later placed upon the consumption of alcohol in that country, and in ten years the number of idiots fell by more than 16 per cent., despite the increase of population 14 per cent.

So much for the indirect harmful effects of alcohol upon children. What of the direct effects?

It has been found by careful investigation that the habit of taking alcoholic stimulants is formed in the majority of instances before the twenty-first year. From a study of cases of alcoholism admitted to Bellevue Hospital, Dr. Alexander Lambert found the following interesting facts:

"Of 259 instances where the age of beginning to drink was known, four began before 6 years of age; thirteen between 12 and 16; one hundred and two between 16 and 21; seventy-one between 21 and 30; and eight only after 30 years of age. Thus, nearly seven per cent. began before 12 years of age, or the seventh school year; thirty per cent. began before the age of 16; and over two-thirds—that is, sixty-eight per cent.—began before 21 years of age."

Many experiments have been conducted to determine the possible direct effects of the consumption of alcohol by the child. It has been demonstrated, by the investigations in this and many other countries, that alcohol, even in moderate doses, enfeebles the power of voluntary attention, retards the ability of calculation, and reduces the complexity of the mental processes.

The results of the work of the Association of Abstinent Teachers in Holland show that in the "very good" and "good" classes of children the abstainers were considerably in the majority; in the "moderate" or "sufficient" classes the proportions were about equal, while in the "inadequate" or "bad" class the proportion of children who drink is more than twice that of the abstainers.

Dr. Leopold Lang, of Vienna, in an investigation of this subject, found a surprisingly large proportion of school children in Holland, Austria, and Germany, who drank beer, wine, and even stronger spirits. For example, in Vienna, it was found that more than 53,000, or over 32 per cent. of the whole number of school children, regularly drank beer, nearly 20,000, or over 11 per cent., wine, and nearly 6000, or 3.5 per cent., spirits.

Fortunately, in Great Britain and America, the consumption of alcoholic beverages by children is not so widespread, apparently, as in continental countries, though it is an evil not to be overlooked. It is to be hoped that the present temperance crusade which is sweeping the country will result in a decreased percentage of epileptic, feeble-minded and idiot children.

Tobacco.—There are few subjects having to do with youth and its regimen concerning which so much has been said as the use of tobacco in its various forms. From time immemorial the growing boy has been warned by his smoke-addicted father of the direful results of smoking; he has been assured that if he uses tobacco in any form he will grow up to be a small, insignificant, pale-faced, hollow-chested man. All this makes little impression on the lad who has no reason to believe that his father had attained his six-foot height before becoming familiar with the cigarette, cigar or pipe, or worse, the "chew." And so the boy smokes and teaches other boys to do likewise, and thus the pernicious habit spreads.

The truth of the matter is that the father's advice is theoretical—he does not know, as a rule, anything definite as to the effects of tobacco on the human system, particularly on that of the growing youth. The boy is quick to divine this lack of knowledge; he considers it a matter of prejudice on the part of his elders, believing that tobacco cannot be very harmful to him if it does no apparent injury to his father. The best prophylactic measure, then, is for the older members of the family to set the example of abstinence in this regard. They should, at least, inform themselves of some of the experimental evidence on the subject, in order to give to the skeptical youth some definite and tangible reasons for the discouraging statements made.

The use of tobacco in any form by persons under the age of full physical development really does stunt growth and dull the intellect. It depresses the circulation; causes palpitation of the heart, on slight exertion; sets up a low-grade catarrhal inflammation of the upper air-passages; leads to chronic conjunctivitis, and impairs the powers of concentration and sustained mental application.

Dr. J. W. Seaver, in his work in physical culture at Yale University, found that the non-smokers of a class for four years gained in weight, height and growth of chest at least eighteen per cent. more than the regular smokers, and at least twelve per cent. more than the irregular smokers. In lung capacity the gain was over fifty per cent. in favor of the non-users, and thirty-five per cent. as compared with the irregular users.

Cigarettes, because of their cheapness, are used in larger quantities by young boys than tobacco in any other form. Inhalation of the smoke causes irritation of the mucous membrane of the entire respiratory tract, and renders the individual more susceptible to attack by the germs of tuberculosis. The excessive use of tobacco in any form, in addition to the disturbances above mentioned, may lead to various nervous troubles, insomnia, irritability of temper, digestive disturbances, and, by over-stimulation, may cause a functional disease of the heart known in adult life as "tobacco heart."

CHAPTER IX

DEFECTIVES

ANY discussion of childhood is incomplete if it neglects a consideration of that large and ever-increasing portion, the defectives—the imbecile, the feeble-minded and the epileptic. When it is considered that in the United States there are nearly 2,000,000 defectives, over 100,000 of whom are feeble-minded (not idiotic, imbecile or insane), and that this number is increasing at the rate of 2000 a year, it is plain that the abnormal no less than the normal child demands and should receive careful study and training.

For sixty years or more France has had schools for idiots and feeble-minded, and Germany and England for a number of years have had special schools for defectives. Seventy-five per cent. of the feeble-minded in Germany have become self-supporting under special management in the fifty-two schools and twelve institutions provided for them.

In the United States the percentage of defectives is greater than it is in Germany, England, France, Italy or Austria, and the proportion in New York City is larger than in any other part of the United States.

The first institution for the training of these unfortunates in the United States was established in Massachusetts in 1848. One by one the various States are coming to realize their obligation to this class of our population.

It is manifestly not within the scope of this volume to discuss the relative merits of the old Malthusian doctrine or its newer Rooseveltian antithesis; nor is it for us to consider the modern science of eugenics. Yet the wonderful experiments of Darwin, and the investigations of Spencer, Haeckel, St. Hiliare, Wallace, and others, along the line of natural selection in the animal kingdom, and of Rimpau and the "Wizard" Burbank in the vegetable world, are fraught with much interesting suggestion as to the possibilities for the upbuilding of the human race by more careful attention to the environment, nutrition and education of the individual.

This involves, of necessity, some more rational control of marriage than is now exercised by sentiment or by law. Much of the eloquence and vituperation expended in condemnation of the "divorce evil" would be spent to far better advantage if devoted to the education of the masses with regard to the regulation of marriage. This, at least, we may demand, that no incurable epileptic, mental, moral or physical degenerate shall be allowed to assume the "holy bonds of wedlock." As Ferri says, "Popular education has swept away the so-called crimes of magic and witchcraft, though they had withstood the most savage punishments of antiquity and mediæval times,"—and so, popular education may, in time, bring about marriage laws which will be effective in at least limiting the perpetuation of the defective classes. In his oration on medicine, delivered at the fifty-sixth annual session of the American Medical Association, Stockton says, "If a matter of class, of caste, or rank, has been sufficiently important to control the forming of marriage contracts, it is not impossible to conceive of a more intelligent public sentiment which would make an alliance with a family celebrated for physical, intellectual and moral superiority, a thing greatly to be desired; and, conversely, which would lead to the abhorrence of an alliance with a family in which freaks, degenerates and incompetents, or in which a tendency toward lowered nutrition, too early maturity, or premature senility, were frequent events."

The British House of Lords at one time declared that to do aught to prevent marriage was the blackest of all political sins, and in this country any attempt to restrain marriage by law has been looked upon as against public policy. Opinion is gradually changing, however, as is indicated by the law recently passed by the state of Indiana forbidding the marriage of imbeciles, epileptics, and persons suffering from certain contagious diseases.

Great progress has been made in the care of defective children, yet much remains to be accomplished. The problem is being carefully studied in such institutions as the New York City Children's Hospitals and Schools, and in the various homes for the feeble-minded and epileptic, both here and abroad. With the greater plasticity of modern education the needs of the various grades of intelligence—the genius, the normal, the feeble-minded and the idiot—are coming more and more to be understood.

In this connection we are reminded of a pathetic incident which occurred a few years ago at Randall's Island. Several children were brought before the Inspection Committee to be judged as to whether or not they were feeble-minded. One of the little boys was blind and partially deaf, but, turning to the chairman of the committee (the writer of this volume) the child said, most beseechingly, "Please, Mister, don't let them call me an idiot!"

The scope of the work of institutions for the feeble-minded is very clearly expressed in the second biennial report of the Michigan Home for the Feeble-Minded and Epileptic, from which we quote: "To provide by all proper and feasible means the intellectual, moral and physical training of that unfortunate portion of the community who have been born or by disease have become imbecile, feeble-minded or epileptic, and by a judicious and well adapted course of training and management to ameliorate their condition and to develop as much as possible their intellectual faculties, to reclaim them from their unhappy condition and fit them, as far as possible, for future usefulness. The feeble-minded and epileptic above the age of six are admitted, the best time for their training and instruction being between eight and twelve."

The following significant facts may be quoted:

The duration of life in the defective falls short, as compared with other individuals.

The most potent factor as a cause is heredity.

Associated with the mental state there is some physical imperfection.

More males than females are mentally defective.

Professor Monroe, of Stanford University, a few years ago obtained data relating to 10,000 pupils in California schools, finding ten per cent. mentally dull and three per cent. feeble-minded. "There are many more," he said, "who, although not positively feeble-minded, skirt the borderland of abnormality, and because of their large numbers (nearly ten per cent. of the whole school enrollment) should receive the thoughtful attention of teachers and specialists."

These borderland cases are now being cared for in the larger cities in the "ungraded classes" of the public schools. By proper medical supervision, the correction of visual defects, removal of hypertrophied adenoids and tonsils, building up the nutrition and general health, much has been accomplished in the way of increasing the efficiency of backward and defective children. Competent neurological and psychiatric oversight will still further facilitate the work by giving proper direction to training required by the peculiar needs of the individual child.

CHAPTER X

THE WAIF

IN our great cities there are problems of duty which touch every life, whether cultured and wealthy or unlettered and poor. Those who come into the world without the privilege of a name and a place need special care and training. There are the waifs, also, of parents given over to drink and utterly evil ways, who are as homeless as the former. Dr. John Barnardo of London did a magnificent and far-reaching work among the waifs of that great city, which, though he is gone to his reward, still continues.

This great question of how to save the children is being considered by Christian and philanthropic men and women as never before, and everyone should be ready to cooperate in the solving of the problem.

The cottage system in our orphan asylums; the placing of little ones in country homes for board and care; the Fresh Air work in the summer, so far as it goes; the giving of the unfortunate mother an opportunity to work and to keep beside her the infant born out of wedlock, are some of the plans which are being successfully carried out.

The far-reaching import of this phase of child life has been so admirably set forth by Alfred Henry Lewis, in a recent editorial in the *New York American,* that we quote from him. What he says applies directly to New York City, but the application is easily extended to all parts of the country.

Under the caption, "Who Saves a Baby Saves a Man," Mr. Lewis says: "There are full three hundred thousand children growing up in New York City whose future holds no ray of honest light. Little criminals from the cradle, girt about and pressed upon by vicious forces which drive them or draw them downward, those days which are to be whitest and best and cleanest of their lives will be the days they spend in jail. The great fraction of these three hundred thousand babies—the unlucky fraction that do not die—are predestined criminals from cradlehood.

"And criminals are communally expensive.

"Add police force to fire department, hospitals and poorhouses to jails, and you will find the New York City public feeling in its annual pocket for roundly $60,000,000. Two-thirds of this sum would be saved were you to rescue those three hundred thousand children from the want and moral mire wherein they wallow. Poets have sung otherwise, but one finds in the life progress of humanity that the stomach rules and flesh has precedence over spirit. Keep a child hungry and cold and homeless and ignorant and ragged, and nine times in ten you make it vicious. Also, its grown-up deeds will be crimes, and cost the public a fat penny. Wherefore, save the children and thereby save expense."

CHAPTER XI

ADOLESCENCE

THE age of adolescence, the period of life from twelve or thirteen to eighteen in the girl, and from twelve to nearly twenty in the boy, is marked by very important physical and mental changes, when the conception of individual responsibility dawns upon the consciousness of the boy and girl with sometimes overwhelming force.

The subject is such an important one, and calls for so much attention upon the part of those who have in charge the training of youth, that it is impossible, in a volume of this scope, to consider its various phases. To give a detailed analysis of the physical and psychical development and peculiarities of this age is not within our province, nor is it for us to discuss the problems involved in the education of the adolescent boy and girl. Those who are especially interested in the subject—as everyone should be who is in any way associated with children—are referred to G. Stanley Hall's "Adolescence," or his "Youth, Its Education, Regimen and Hygiene," and other works of this character.

We wish here merely to call attention to some practical points having direct bearing upon the physical well-being of the boy and girl of this important age, in the hope that it will stimulate our readers to a more thorough study of the subject.

The transitional state, not only of certain physical characters, but of the mental and emotional natures as well, the tendencies to disease, to the formation of certain morbid habits and states of mind, emphasize the vital importance of this period of life, and the necessity for parents, guardians and teachers to inform themselves concerning it.

No period of life calls more strongly for prophylactic management than this, for while the pubescent individual is not so susceptible to the usual diseases of childhood, liability to certain other affections, such as rheumatism, diseases of the osseous, muscular, nervous, and circulatory systems, is increased. The child is now prone to certain "borderland" maladies of the mind and body. Chorea (St Vitus' Dance), epilepsy, hysteria, goitre, anemia, chlorosis ("green sickness" in girls), eye diseases, etc., are some of the affections to which children of this age are peculiarly liable.

Dr. Hertel publishes his findings upon examination of 3141 boys, and 1211 girls, in the schools of Copenhagen. Just before puberty the percentage of sickly boys reached 40 per cent. It then dropped to 30 per cent., remaining so for a few years. Among the girls from twelve to sixteen years of age there were 10 per cent. more sickly than well ones. The Danish government, taking up the subject, examined 16,889 boys and 11,225 girls, finding 20 per cent. of boys and 41 per cent. of girls sickly. (Hall.) Similar investigations carried on by different governments, as well as individuals, have led to like results.

From these figures it is easily to be inferred that especial attention should be devoted to the physical well-being of the boy and girl about to enter upon this period of life, a period which levies such a heavy tax upon both physical and mental strength, as well as upon moral integrity.

This is a time when the nerve-tissue is in a hyper-irritable state, in consequence of which not only may physical energies be misdirected, but the mental and moral as well. Escapades of one kind or another, wilfulness, impulsiveness, adolescent insanity, and various manifestations of immorality, may mark this period.

The school age, of which adolescence is the most trying time, has been called the "nascent period of the nervous system." The nervous energy, which is being called more and more into requisition, should be properly directed, curbed here and given free latitude there. The development and maintenance of a stable nervous equilibrium depends in large measure upon the function of the rest of the organism. Various reflex neuroses—nervous disorders caused by improper functioning of some organ—and functional disorders of various kinds, are prone to develop at this age.

Eye defects, for example, which have been overlooked throughout the earlier periods of childhood, may now, under stress of the exigencies of puberty, lead to extreme nervousness, to insomnia, nightmare, indigestion, palpitation of the heart, headache, vertigo, and choreic movements. Loss of ambition, inability to fix the attention, distaste for study or for any serious occupation, and apparent general sluggishness and dulness may also result from this cause. Even wryneck and curvature of the spine are said to often result from severe eye-strain.

Abnormal conditions in the naso-pharynx and nose may give rise to reflex disturbances. Nasal cavities which are packed with polypoid growths may interfere seriously with the brain work entailed upon the adolescent youth by our modern system of education. Hypertrophied adenoids, present, perhaps, from early childhood, may lead to like results. Impaired hearing, from whatever cause, is a serious handicap at this sensitive, transitional period. The brain, trying to fulfil the requirements made upon it, undergoes stress and strain which it is incapable of meeting successfully.

Even the untrained but zealously watchful eye of parent, guardian or teacher, can detect these many danger-signals, and once they are recognized, neither social prestige, personal ambition, nor an over-weening sense of supposed duty to the child, should allow them to go unheeded.

The curriculum of our schools is being enlarged and the standards raised year by year, in a manner which is not commensurate with the physical endurance of the average student. Desire for high culture in the young people leads the ambitious parent or guardian to allow the work of the schoolroom to be augmented by lessons in art, in music, in deportment, or in this or that accomplishment, until the tired and overwrought nerves of the adolescent boy or girl give way under the constant tension. Over-filled sanitariums and insane wards, the increasing number of suicides, the army of neurasthenic men and women seeking relief at the shrine of some new cure-fad, are many times evidences of overworked body and mind during school life. It is an imperative duty that their elders allow to young people greater reserve power with which to meet the strain and stress of the noontime of life.

"What Boys and Girls Ought to Know." —Much has been written with reference to "what boys and girls ought to know" (regarding matters of sex, marriage, etc.), at what age they should be enlightened, and upon whom the duty of imparting this knowledge should logically fall. The opinions expressed show every variation, from prudery to the most "advanced thought." Everyone must agree that no general rule can be laid down which disregards the personal equation. It would be just as unwise to force upon the timid, modest, sensitive girl a full knowledge of the mystery of life as it would be to withhold such knowledge from the bold, inquisitive, would-be-wise

boy. Certainly such knowledge as is necessary for the *maintenance of health* should be imparted to both boy and girl; further thàn that the exigencies of the particular case should be the guide. At a recent meeting of the Women's Medical Association of New York City, held under the auspices of the Committee on Social Hygiene, Mrs. Harriet Stanton Blatch, in discussing the subject now under consideration, said: "Whenever the child asks a question, answer it. My little girl asked me a most profound question when she was three and a half years old. I answered it in a very simple way, and the questioning and answering have continued ever since."

Havelock Ellis, in a paper recently read before the Chicago Women's Medical Club, says: "There can be little doubt that before puberty the parents, and especially the mother, are the proper instructors of their children in esoteric knowledge. But after puberty the case is altered. The boy and girl are becoming less amenable to parental influence, there is greater shyness on both sides, and the parents rarely possess the more technical knowledge that is now required. At this stage it seems that the assistance of the physician should be called in." Naturally, it should be the part of a male physician to instruct the boy and of a woman physician to instruct the girl.

Ellis continues: "In a private and individual conversation between the novice in life and the expert, it is possible to say many necessary things that could not be said in public, and it is possible, moreover, for the youth to ask questions which shyness and reserve make it impossible to put to parents, while the convenient opportunity of putting them naturally to the expert otherwise seldom or never occurs. Must youths have their own special ignorances, their own special difficulties and ignorances that could sometimes be resolved by a word? Yet it by no means infrequently happens that they carry them far on into adult life because they have lacked the opportunity, or the skill and assurance to create the opportunity, of obtaining enlightenment.

"It must be clearly understood that these talks are of medical, hygienic, and physiological character; they are not to be used for retailing moral platitudes. To make them that would be a fatal mistake. The young are often very hostile to merely conventional moral maxims, and suspect their hollowness, not always without reason. The end to be aimed at here is enlightenment. Certainly knowledge can never be immoral, but nothing is gained by jumbling up knowledge and morality together.

"In emphasizing the nature of the physician's task in this matter as purely and simply that of wise practical enlightenment, nothing is implied against the advantages, and indeed the immense value in sexual hygiene, of the moral, religious, ideal elements of life. It is not the primary business of the physician to inspire these, but they have a very intimate relation with sexual life, and every boy and girl at puberty, and never before puberty, should be granted the privilege—and not the duty or the task—of initiation into those elements of the world's life which are at the same time natural functions of the adolescent soul. Here, however, is the sphere of the religious or ethical teacher. At puberty he has his great opportunity, the greatest he can ever obtain. The flower of sex that blossoms in the body at puberty has its spiritual counterpart which at the same moment blossoms in the soul."

Dunce versus Genius.—Despite the many physical, mental and moral pitfalls into which the adolescent youth may stumble if not wisely guided, history abounds with instances of brilliant achievements by those who are still in the morning of life. In literature, in art, in public life, in religion,—in every avenue of human activity, young men have acted well their part. Victor Hugo, at fifteen, and Leigh Hunt, at sixteen, had given to the world ample evidence of the splendid work to come. Alexander Hamilton had become conspicuous in the public eye by the time he was seventeen, and Washington Irving was a prolific writer at the same age. Charles Spurgeon, the great evangelist, was already entered upon his active ministerial and evangelistic work at eighteen. At nineteen George Washington was a major, and at the same age Joan of Arc was burned at the stake for her heroism. And so, throughout the years of this trying period of life, many illustrious names might be mentioned of those whose work in their respective fields of endeavor have given brilliant promise of greater things.

On the other hand, many an adolescent youth has been dubbed by his short-sighted elders as "dunce," "dullard," "incorrigible," and many other similar epithets, who, in after years, gave to the world masterpieces of literature, art, music, philosophy, or heroic deeds. "An interesting chapter," it has been said, "might be written on the subject of illustrious dunces,—dull boys, but brilliant men." Newton, for example, stood at the bottom of his class until aroused to his own powers by resenting a kick inflicted by the boy above him. The "dunce" quickly rose to the top of his class, after this, and few names are written higher on the scroll of the world's great men than that of Sir

Isaac Newton. Walter Scott was so dull at school that his teacher said of him, "Dunce he was, and dunce he would remain." Burns and Goldsmith were similarly rated by their associates, as were also Napoleon and Wellington. The list is long of boys who were looked upon as "stupendous boobies," who later thrilled the world with their splendid achievements.

We cannot refrain, before leaving the discussion of the Morning of Life, from quoting two passages, without comment, from one who, however much he may have failed in practice, was and is by precept, a great teacher of teachers,—Jean Jacques Rousseau:

"If mothers are not real mothers, children are not real children toward them. Their duties to one another are reciprocal, and if these be badly fulfilled on the one side, they will be neglected on the other side. The child ought to love his mother before he knows that it is his duty to love her. If the voice of natural affection be not strengthened by care, it will grow dumb, even in childhood; and thus the heart dies, so to speak, before it is born."

"A father, when he brings his children into existence and supports them, has, in so doing, fulfilled only a third part of his task. To the human race he owes men; to society, men fitted for society; to the State, citizens."

Part IV

MIDDAY

“ It matters not how straight the gate,
How charged with punishment the scroll;
I am the master of my fate,
I am the captain of my soul.”

CHAPTER XII

MIDDAY

HOW fortunate the man or woman who, looking out over the sea of life from the vantage-point of youth and enthusiasm, can face the future with the assurance of the foregoing lines!

Having passed safely the whirlpools and breakers of infancy, childhood and adolescence, with the skillful piloting of the mother-hand, the little craft sails out into the broader waters of the open sea of manhood or womanhood, unpiloted now, perhaps, save by the influence of those who have stemmed the tide before.

The ocean of life is not always calm, and the little bark must surely, sooner or later, encounter tempestuous seas. To some the harmless whitecaps may seem perilous waves, while to others the mountain-like billows will seem but ripples. The wise helmsman will realize the insignificance of the one and the possible danger of the other;—he will see the danger-signals along the way, interpret their meaning, and do his utmost to steer the little craft safely into the still waters of the harbor.

In the vigor of early manhood and womanhood we are in danger of losing sight of the possibility of storms to come, of waning vitality, of misused energies, and of the possible losing of the way in the mad pursuit of pleasure or gain, or in the race to catch the mirage of ambition. The warning signals are too often passed unheeded, each successive danger portended being graver than the last, until, finally, the rocks of ruin are dangerously near.

Let us pass in review some of the danger-signals, physical and psychical, which mark life's voyage at the noontime, and which, if heeded, will enable us to successfully battle with the waves, bravely meet the tempests, and in safety reach the peaceful haven.

A threadbare aphorism says, "weak body,

weak mind," and Rousseau has said, "To make the processes of the mind facile and sure, the body must be kept strong and robust." Nevertheless, as Metchnikoff has pointed out, a valuable existence of great service to humanity is compatible with a feeble constitution and precarious health, in proof of which he cites the names of Fresnel, Leopardi, Weber, Schumann, and Chopin. The list is easily augmented. William of Orange, subsequently William III. of England, who died at the age of fifty-two, having been in ill health from infancy; Elizabeth Barrett Browning, one of the greatest poets, always in ill health; Robert Louis Stevenson, who used his pen with wonderful skill while suffering from tuberculosis; John Milton, with eyesight gradually failing for years and with final complete loss of vision, was nevertheless an indefatigable worker; many others, the victims of physical ailments of greater or less severity, give ample refutation to the idea that physical perfection is essential to mental virility.

These brilliant exceptions, however, but tend to emphasize by contrast the importance of the rule that the harmonious working of all the functions, those purely physical as well as those psychical, are necessary to the maintenance of that perfect equilibrium which means the greatest accomplishment, the maximum good.

How can this equilibrium be maintained? Let us look for a moment at the physical and psychical aspects of the question, believing "that man is capable of much," and for this reason hoping "that he may be able to modify his own nature and transform his disharmonies into harmonies."

PHYSICAL CONSIDERATIONS

Regular Habits.—In our day of strenuous living few of us test the truth of the old saying, "Early to bed, early to rise, makes a man healthy, wealthy and wise." Yet under our tense modern civilization the regular habits of life which are suggested by the couplet are more important than ever before. It is not sufficient that we sleep enough, unless other habits are regulated accordingly; it is pernicious to exercise abundantly, unless this is balanced by sufficient rest and sleep; and neither sleep nor exercise nor rest will profit much if not reinforced by wholesome and regular diet.

Exercise.—This is such a flexible term, and capable of so many interpretations, that it is difficult to meet the requirements of every case. The housewife who is sure that she "walks miles every day" in the routine of her household duties, resents the suggestion that she does not take enough exercise; and, indeed, it may not be true that she does not take *enough,* though it may be true that she does not take enough of the *right kind* of exercise. The man who has stood on his feet in a store from early morning till late afternoon thinks the doctor a "physical culture crank" who recommends exercise for his tired body. Yet each is aware that a horse that travels all day over an up-hill-and-down-dale country is not nearly so tired as the one that has traveled the same number of hours over a level road. The reason is obvious. The first horse has a chance to exercise different sets of muscles, resting one set while the other works; the second uses the same set of muscles all day. Instructors in physical culture have acted upon this physiological principle, and have devised suitable exercises to offset the habit-exercise contingent upon daily life and labor.

Healthful exercise is a very important factor in the maintenance of physical well-being. Disease of any part means, after a time, weakening, and later atrophy, of the muscles, with often an accumulation of fat which further diminishes functional power. The body as a whole suffers, the system becomes clogged, and a long chain of ills is apt to follow.

The problem of the right amount and kind of exercise for the average boy or girl in the growing years has been met and admirably solved by gymnasia all over the country, and by such leaders in the department of physical education as Posse, Anderson, Gulick, Bolin, and a score of others. But what of the question as applied to the midday of life?

To meet the need for exercise during this period, golf, tennis, bowling, horseback riding, and gymnastics under direction of competent instructors, answer admirably for those who can avail themselves of such privileges. For those who cannot, various systems of home exercises have been devised. Ten minutes a day of systematic and *properly executed* movements will greatly help in the *maintenance* of health. For the purpose of *restoring* health gymnastic exercises should never be undertaken except under the supervision of those competent to judge of the needs of the individual case. The technic of physical exercise is properly left to those who have devoted especial study to the subject. Emily M. Bishop, in her admirable books, "Health and Self-expression," and "Seventy Years Young," Clara Z. Moore, in her helpful lectures, Blakie, in his "How to Get Strong and How to Stay So," and the experts whom we have already mentioned, in their numerous writings, have covered this ground so thoroughly that it is an easy matter for any person, in whatever station in life, to work out a physical regime suited to the individual's needs and habits of life, provided there be no important defect needing special care and attention, the essential idea being health maintenance rather than "health culture."

Fresh Air.—A medical journal some time ago, in a set of suggestions as to how to live a century, emphasized the importance of out-of-door exercise, holding that no person should let a day pass without spending three or four hours in the open air. It may not be feasible for everyone to follow this rule, yet it should be borne in mind, and as much time as possible spent in the open. This applies to all ages and all conditions, and is one of the greatest safeguards to health. Golf, tennis, and other outdoor games have this advantage, that they furnish a felicitous combination of air and exercise.

The outdoor air is very important, yet the quality of the indoor air is even more so. A spin or a walk in the park or in the country when the day's work is ended, to tone up the tired nerves and to replace the vitiated air in the lungs with the ozone of the hills, is of little avail if one returns to a stuffy, ill-ventilated room for the remainder of the night. "Window sleeping," in tents devised for the purpose, has solved the problem of ventilation in many instances, and should have a more general application than for tuberculosis, for which it is most frequently employed.

The wonderful work being accomplished with the aid of fresh air for the victims of the Great White Plague is familiar to all, and it is a well-known fact among medical men that persons suffering from other diseases, notably pneumonia, do better when supplied with plenty of fresh air. In some hospitals it is now the custom to take such patients to the roof-garden, winter and summer. It is particularly important that those afflicted with chronic affections be in the open air as much as possible. Fresh air and sunshine are Nature's strongest weapons in protecting and maintaining health, and in restoring it when once it is impaired.

Diet.—There are many absurdities, not to say crimes, perpetrated in the name of diet. The name of "food experts" is legion, from the advocate of uncooked foods to the scientific exponent of the modern cooking-school. Through all time the "what shall we eat" has been of as much or more concern than the "wherewithal shall we be clothed." Yet, after all, in such matters every man is a law unto himself, and should be guided by the rules of common sense, supplemented by what his own experience teaches him. If these are not sufficient to enable him to practically forget that he has a stomach, he should consult a physician.

With the advocates of prolonged mastication urging that to chew well and long is to prolong life, and with the opponents of this theory pointing out its possible dangers—with the Scylla of too-slow eating on the one side, and the Charybdis of too-fast eating on the other,—the student of dietetics and the seeker after good health is in peril of foundering upon the rocks. Temperance and common sense are excellent guides. In fact, the perfectly healthy individual can digest nearly anything that is edible. It is only when the digestive organs have been abused, when they are congenitally deficient, or when their function has been weakened or otherwise impaired by disease, that it becomes necessary to call into requisition the diet list. Even in mild disturbances of the general system, the mind has much to do with proper assimilation, and the cultivation of a cheerful spirit will often accomplish more than the too careful regulation of the diet.

This is illustrated in the story of an elderly woman who for twenty years or more believed that her "intestinal indigestion" would not permit her to eat anything but dry toast and boiled milk—a diet, by the way, which would tax the digestive powers of even the ostrich, with its all-devouring stomach. Finally, a "New Fad" brother came to the town and propounded the doctrines of his new belief. The old lady for a month or more missed not one of his lectures. So strongly did she become impressed with the idea that if she followed his teaching she would enjoy, among other blessings, the ability to eliminate the dry toast and boiled milk, that she went home one day determined to test her new faith. It was summer, and the family table was laden with the good things of the season,—green corn, string beans, tomatoes, even cucumbers, blackberry pie,—and, provided for her, dry toast and boiled milk. Consternation reigned supreme when the family saw the old lady turn away from her accustomed diet and attack the green corn and the rest with vigor and appetite. Remonstrances were in vain. She was satisfied that nothing could hurt her, because "Brother So-and-So" had so assured her. The family contemplated funeral arrangements, but were happily disappointed. For two weeks she was well and enjoyed every meal. But the "Brother" went on his way, and with his departure the old lady's courage failed. The good things of the family table soon began to disagree, and in a few weeks more she returned to her milk and toast diet, remaining on it till her death, several years later. *Haec fabula docet!*

It is not within our province to discuss the relative food values, their heat-producing qualities, etc., nor yet the mechanism of metabolism. For all this the reader is referred to special works on nutrition. It may not be amiss, however, to give a few brief statements with reference to the kinds of food-stuff, and the quantities of each requisite to the average diet.

All foods, whether animal or vegetable, are composed of representatives of one or more of the following classes of food-stuffs:

(1) Proteids or albuminous substances (sometimes called nitrogenous, because of the large proportion, 16 per cent., of nitrogen which they contain).

(2) Carbohydrates (starches and sugars).

(3) Fats.

Proteid, albuminous or nitrogenous substances form the chief constituents of all organs and tissues, whether animal or vegetable, and are, therefore, the main element of the diet of man and animal, without which life, growth and repair would be impossible. The proteids, then, are tissue-building, standing in intimate relationship to the vital processes of the organism. No other foodstuff can supply their place in the animal economy. The quantity, however, of proteid material required varies with the exigences of the individual life.

Carbohydrates, which include starches and sugars, are not tissue-builders, but because they are easily oxidized or burned they yield heat and energy. When supplied in excess of the need of the body for heat and energy, they may be transformed into fat, which is deposited in the tissues, to be utilized as needed by the organism.

Fats, like carbohydrates, serve as fuel in the body for the production of heat and energy, but they are not tissue-builders.

While carbohydrates and fats may undergo complete combustion to carbon dioxid and water, which are easily eliminated by the lungs, skin, etc., proteid matter is incompletely oxidized, so that that portion which is not utilized for tissue-building and the production of heat and energy, must be eliminated by the liver and the kidneys. From this it will be seen that the economical body-fuels are fats and carbohydrates, not proteids, and that an excess of proteid food is an unnecessary tax upon the organs of elimination. It will also be inferred that the diet of an individual at any time of life should consist of a mixture of these three kinds of food-stuff in such quantity and proportion as will least burden the organism while most perfectly meeting its demands. Elaborate tables of food values, "standard dietaries," etc., have been compiled, for which the reader is referred to books on food, nutrition, and allied subjects.

Chittenden has shown that the allowance of proteid necessary for continued health and strength may be reduced during many months to half or less of what the habit of the appetite suggests. He is convinced that the large quantity of proteid in the ordinary diet imposes a needless strain upon the liver, kidneys, and other organs concerned in proteid metabolism and elimination.

The more nearly the intake of food corresponds to the actual needs of the organism, the less danger is there of that which should serve as nutriment becoming converted into a poison to the system. Hence, the value of the experiments of Chittenden, Fletcher, Atwood, and many others, who have devoted much attention to this subject.

"The combustion of proteid within the organism," says Curtis, "yields a solid ash which must be raked down by the liver and thrown out by the kidneys. Now, when this task gets to be over-laborious, the laborers are likely to go on a strike. The grate, then, is not properly raked; clinkers form, and slowly the smothered fire glows dull and dies."

In a general way it may be said that a long list of evil consequences may follow in the wake of an over-consumption of proteid. Gastro-intestinal disturbances, indigestion, intestinal toxemia, liver troubles, biliousness, gout, rheumatism, and various other ills of greater or less severity, may result.

It has been said, with reference to overeating, whether of proteid or other foodstuffs, that "in the one case, the subject burns, instantly and mercilessly, every stick of fuel at his door, whether or not he needs the resulting hot fire roaring within, while the other, miser-like, hoards the rest in vast piles, filling the house from cellar to garret." The result, as may be easily imagined, is thinness on the one hand and obesity on the other.

A great deal of attention has been given of late years to what has been called the "sugar vice." The excessive use of sugar is thought by many to be almost as harmful as the excessive consumption of flesh-meat. "Certainly," says one writer, "the excessive use of sugar is unquestionably responsible, in a very large measure, for the universal dyspepsia and indigestion which exists upon this continent." Starch, or some of its modifications, including sugar, "forms possibly four-fifths of all the food consumed by the human race; hence, the maldigestion of starch and its derivatives is a factor of immense importance, in whatever way it relates to the dietetics of starch or to the dietetics of sugar."

Starch indigestion or sugar indigestion results in fermentation, with the formation of various acids which may irritate the mucous membrane of the stomach and intestines, and give rise to gastric and intestinal catarrh, as well as to catarrh of all the mucous membranes of the body. Obesity, gall-stones, jaundice, general diseases of the liver, diabetes, and other diseases, are believed by many to be produced by the excessive use of sugar. Given starch or sugar, water or some other fluid, and the yeast ferment usually present in the stomach, and the process of fermentation is easily set up. The formation of carbonic acid gas follows, and the presence of this gas in the stomach results in the displacement of neighboring organs, cold hands and feet, palpitation of the heart, headache, neuralgic pains, and other unpleasant conditions.

Any marked excess of food results in auto-intoxication of greater or less severity. One author, following up the evil effects of over-eating, says: "Primarily, it distends the walls of the stomach, lessening its muscular power, and finally weakening the organ beyond recovery, producing what is known as a dilated stomach, which must always remain a weak stomach. The object of eating—the nourishment of the body—is entirely defeated in that the original character of the food is wholly changed, so that instead of a clean, assimilable, milk-like fluid, *chyme,* there is formed a fermenting and decaying mass, the absorption of which can have but one effect, poisoning, ending in many instances in the death of the individual after sudden outbursts of appendicitis or enteritis. This circulation of poisoned blood in the human body, causing continual inflammation of the delicate cells of the lungs, kidneys, liver, or other organs, can have but one result—in the long run—disease; it may be Bright's disease of the kidneys, cancer of the liver, tuberculosis of the lungs, diabetes, pneumonia, rheumatism, or premature senile decay." In other words, "one-fourth of what we eat keeps us; the rest keeps the doctors."

On the other hand, it has been charged against the various systems of "reformed diet" that the great fault to which they lead is under-feeding, which, if true, will result in as disastrous consequences as does over-feeding.

For the average individual, who knows little and cares less about "food values," "tissue-building," etc., and who either lives to eat or eats to live, any discussion of nutrition and allied subjects is altogether tiresome. The following practical suggestions of Dr. William Van V. Hayes, specialist in diseases of the digestive system, cover the dietary requirements of such persons: "The diet should be plain and well cooked, with a fairly low percentage of proteid (meat, poultry, fish, eggs). The old rule of our grandfathers, 'meat once a day,' has much to commend it. Moderation in taking sweets and fats is also important for those who are not actively engaged in outdoor life. There is little danger of over-eating so long as the mastication is thorough, and the food plain and lightly seasoned." To many who have given the matter no special consideration the whole subject resolves itself into a question of individual taste, appetite and experience. They decide, not altogether unwisely, that, after all, "hunger is the best sauce," and "that which tickles the palate pads the bones."

Food Adulteration.—No discussion of food is complete under existing conditions without some reference to the question of food adulteration. It may be justly said that we are powerless to prevent the evil, but we should, at least, lend our mite of influence to the efforts being made in some quarters to overcome the tendency of modern greed and commercialism in this direction.

So long as there is any doubt as to the purity of the food products, whether these be canned vegetables and fruits, packed meats, poultry and fish, milk, butter, or other articles of diet, every possible precaution in the way of cooking and other available measures of prevention should be adopted. The housewife should be more careful in the selection of such articles than is often the case. It is very easy to fall into the "penny wise and pound foolish" practice in such matters, and to thoughtlessly endanger the welfare of the members of the household by the consideration of price rather than quality. In so far as it is possible, the housewife should become informed upon the subject of the relative merits of the different sources of supply of food products, and she should demand those which comply with the authorized requirements. Any suspected infringement of the Pure Food Law should be immediately reported to the proper Federal authorities. Everyone who allows a violation of the law to go unnoticed is in so much *particeps criminis.* It is only by the co-operation of the individuals of the community with those in authority that such evils will be corrected.

Rest.—The modern business and professional man and woman seem to have unconsciously adopted the motto, "*Ruhe ich, so roste ich*" (if I rest I rust), and to have taken it with distressing and sometimes disastrous seriousness. Associated with this reckless disregard of day and night, of rest and labor, comes a train of other indiscretions—irregularity in eating, lack of proper exercise, inattention to the bath, neglect of the bodily functions, etc. Overwrought nerves, disturbed digestion, loss or vitiation of appetite, resort to stimulants, insomnia, in time disturbed mental equilibrium, worry, fretfulness, suspiciousness, are among the unhappy consequences of such disregard of Nature's laws.

Physical chaos then reigns supreme, where all should be order and harmony. The result is that the noonday of life is reached without the needed strength for its duties, and the eventide comes before the noontime has fulfilled its promise.

Women are, perhaps, the greatest offenders along this line, because of their so-called "puttering habit." Clara Barton, when asked the secret of her youthfulness, said: "How do I stand all this wear and tear? Economy. That's it, economy. I save my strength. When I'm not working at the business which is my life, I either rest or play. I don't putter. That's what ages women—puttering." The saying, "let us work while we work, and play while we play," is as virile to-day as ever. Rest, real rest, not make-believe rest, is the great balance wheel in the machinery of life. "Power through repose" should be cultivated by all.

Recreation.—The close ally of rest is recreation. If the two can be combined, well and good, for they should be in reality one. An editorial in a New York paper a short time ago gave some good advice suggested by the story of a woman fifty-seven years old who was competing in a ten-mile swimming race. Attention was called to the fact that there was a time in this country, now happily passed, when women thought it necessary to reconcile themselves to the approach of old age at thirty-five. "For every middle-aged man knocking little white balls around the golf links there should be at least one woman of his age, or older, beating him at the game." And again, "For every middle-aged man amusing himself here and there, there should be a woman as old amusing herself, and setting him the good example he often needs."

Whatever the nature of the recreation, it should be taken, if possible, out-of-doors, and should be undisturbed by any thought of the serious business of life. Recreation of the right sort means re-creation; otherwise it is dissipation.

Moderation.—The question of temperance, like many others, is relative. A story is told of a judge in a Georgia court who was an ardent advocate of temperance, and who never lost an opportunity, whether in the courtroom or elsewhere, to express his views. Upon one occasion a witness was called who gave his age as eighty-two. The judge was so impressed by the youthful appearance of the man that he scented the opportunity for some telling strokes for the temperance cause. "You say you are eighty-two years old, Mr. Brown?" "Yes, Judge." "Well, you don't look over fifty-two. You must have led a very temperate life?" "Yes, Judge, I have. And I don't feel any older than I look." "You don't drink?" "Never in my life." "And you don't use tobacco?" "Never in my life." "How about tea and coffee?" "I never touch either." The witness being dismissed, the temperance lecture was forthwith delivered. The next witness called was also named Brown, and was an equally fine specimen of manhood. He gave his age as eighty-four. Here was another shining example of temperance, thought the Judge. Mr. Brown No. 2 confessed to being the other man's elder brother. "You, too, have always been well and hearty, Mr. Brown?" asked the Judge. "Yes, Judge." "Were you ever sick?" "Never in my life —always been well and strong." "And you have led just as temperate a life as your brother, I dare say?" "Well, Judge, I don't know about that, but I feel just about as young." "You don't drink, do you?" "Yes, about a pint of whiskey a day for so long that I don't remember when I didn't do it." The Judge gasped. "But you don't smoke?" "I don't remember when I learned to smoke and chew tobacco, I've been doing it so long." "Well, how about coffee?" "Three cups a day, Judge, ever since I can remember." It is not recorded what effect this incident had upon the temperance cause in that locality.

Alcohol.—When the subject of temperance is mentioned the mind naturally reverts to the question of alcoholism, possibly because of its diverse and far-reaching consequences, and of the infrequency of the reformation of those who are its victims. The higher centres being the first to fall under the blighting influence of the habitual excessive use of this insidious poison, the moral sense is early lost. It is this result of alcoholism that has stamped itself so indelibly upon the public mind. The habitual victim soon becomes practically irresponsible, is in the same category as an insane person, and should be so considered in the eyes of the law and of the public. A drunken man upon the street is generally regarded as an object of pity, and while the crowd may laugh at his antics, he is usually accorded the needful temporary protection. But, with a few exceptions, the States make no adequate provision for these unfortunates. They should be considered, when the chronic stage is reached, as sick men and women in need of proper housing and care, and should not be allowed to roam the streets at large.

At a recent meeting of the American Society for the Study of Inebriety, Dr. D. H. Brower, of Chicago, in a paper entitled "The Prevalence of Alcohol as an Active and Predisposing Cause of Brain and Nervous Diseases," asserted that the most advanced students in the etiology of neurotic diseases give to alcohol a more and more prominent place, and that, next to syphilis, it may be considered the greatest active cause of the nervous diseases of modern civilization.

The figurative boast of Xerxes, King of the Persians, "I have been able to drink much wine and to bear it well," can be applied literally by few. The drinking of "much wine" leads to such patent evil effects that they are of common knowledge. Many diseases, notably diabetes, gout, gastric catarrh, atrophic cirrhosis of the liver ("gin-drinker's liver"), nephritis (Bright's disease), arterio-sclerosis (hardening of the arteries), with its tendency to apoplexy, and various nervous diseases, have as a frequent etiologic factor the excessive use of alcoholic beverages.

While the insidious effects of alcohol in smaller doses are less apparent, they are none the less certainly harmful, and often the "moderate drinker" finds it as difficult to reform as does the "confirmed toper." In small quantities, frequently repeated, the poison of alcohol irritates the meshwork of connective tissue strands in which the essential cells of the body are embedded, and these strands contract, strangulating, so to speak, the essential cells. Various views are held as to the extent and permanence of the injury thus done to the body. It is reasonable to suppose, that here, as elsewhere, the personal equation must be considered, the tissues of some persons being more susceptible to such injury than others, but it is fair to assume that in the vast majority of cases there is a weakening of the organism as a whole.

Dr. H. F. Harris, Secretary of the State Board of Health of Georgia, in a recent article on Bright's Disease, in the *Atlanta Journal-Record of Medicine,* calls attention to the evil effects of the moderate drinking of stimulants. The drinking of wine and other alcoholic beverages with meals, for example, according to this authority, so stimulates the appetite that over-eating is the result. All the organs concerned in the processes of digestion and assimilation are thus over-taxed, and in time fail to perform their function in a normal manner.

Dr. Ellis Saunders Allen, of Louisville, Ky., in an article recently published in the *American Practitioner and News,* under the title, "The Effect of Alcohol on Protoplasm," says: "Man, as a result of freedom with his toddy, is indeed a slave within himself, bound and tied with cords which only break when the vital spark has gone out." The nerve cells lose their resiliency and their ability to respond to the central wave of nerve force; the nerve cords are bound down, and the nerve terminals lose their sensitiveness. As a result the brain does not receive impressions from the periphery as it normally does. "Man thus acquires," continues Dr. Allen, "a perverted, unresponsive and obstruent nervous mechanism, which demands a constant artificial stirring, a continuous oiling of the wheels of the machine, that is, a repeated consumption of the stimulating agent, resulting in an ineradicable habit, a morbid taste, a second nature."

From the above it will be seen (if further evidence is needed) that if total abstinence is not practised it is at least most important that the use of alcoholic beverages be very moderate.

The evils of "drink" are so apparent that the preaching of temperance and moderation in this regard is apt to overshadow the importance of self-control in all other respects. Moderation in the use of coffee, tea, tobacco, in diet, in exercise, in work and in play, in speech,—in all things, in short,—moderation is the great balance wheel of life. Intemperance in any form tends just so much to destroy the harmony of life and to lower the standard of efficiency.

Tobacco.—We have already seen what the excessive use of tobacco will lead to in childhood and adolescence. Continued into manhood the evil effects will be intensified, or, at least, rendered chronic. Used in excess it may give rise to chronic catarrhal inflammation of the nose, mouth, pharynx, and larynx; nervous affections of the heart, palpitation, intermittence of the heart beat, and, later, inflammation of the heart muscle itself (myocarditis); digestive troubles, loss of appetite, gastritis, insomnia, nervous tremors, muscular twitchings, and partial or complete temporary blindness.

Artificial "Props."—In the stress of modern life, particularly in the large cities, with their manifold taxes upon vitality, there is with many a tendency to tide over the given strain, be it work, or worry, or illness, by an artificial prop of some kind. First tea and coffee, perhaps, are taken to whip up the lagging body and stimulate the tired brain; then whiskey, to drown the temporary sorrow or to relax the overwrought nerves, and, last, morphine or some kindred drug, to soothe the racking pain or to still more completely dull the wounded spirits, until finally neither stimulant nor sedative can bring back the lost resiliency or restore the waning powers.

It is the duty of every man and woman to lay by a usable surplus of physical, mental and moral strength, so that when emergencies come, when crises arise, when there is, so to speak, a "run on the bank" of life, the demands for funds—for ability to meet the exigencies—may be complied with promptly, decisively, and without exhausting the surplus.

Prevention of Disease is always better than cure, and it is the part of wisdom to be watchful. It has been well said, "To guard is better than to heal." Just as the engine is carefully inspected for possible breaks of minor importance which, if neglected, might lead to serious trouble, so the human machine, particularly when running at its maximum speed, should be examined at reasonable intervals. The prevention of the slipping of physical cogs, and the assurance that all parts of the wonderful machine are working properly and harmoniously, will thus be effected. And just as the expert engineer can detect flaws which the untrained eye cannot see, so the man trained to recognize and treat flaws in the physical organism can find danger-signals which to the untrained and less watchful observer are meaningless.

Realizing that civilization has given us teeth less permanent than those of our savage ancestors, most of us, with more or less regularity, visit the dentist; but wise precautionary habits should not be limited to the teeth. The Chinese in this regard are in advance of their Occidental brothers. They pay the doctor to keep the family well, and, failing in this duty, he receives no compensation. Such a plan may be feasible in China, but under the Occidental high-tension system of living the demand upon the doctor's time and experience must be largely in the nature of cure. Yet both physician and patient must be alert to prevent disease.

Errors of digestion and assimilation often go uncorrected until irreparable harm is done; tumors, benign in their incipiency, are ignored, so far as treatment is concerned, until their increasing malignancy menaces and often destroys life. Many conditions might be cited which, with thoughtless unconcern, are allowed to progress to more or less dangerous stages before the doctor is consulted.

Certain changes must of necessity take place in the human organism as age advances; the eyes are dimmed, the ears dulled, and the blood current slowed by the passing years; but these can be so long delayed by proper watch-care and correct living that time is almost outwitted. To the medical axiom, "man is as old as his arteries," may be added, that by proper living man can keep his arteries young.

Serum-therapy.—One of the most beneficent advances of modern times is the prevention and cure of certain infectious diseases by means of what is known to the medical world as "serum-therapy," the injection of antitoxic or antibacterial serums. Under this term may be included preventive measures, such as vaccination for small-pox, and curative measures, such as the administration of antitoxin in diphtheria. In some instances, notably diphtheria, the serum may be both preventive and curative.

Long before the invention of the compound microscope and the discovery thereby of our millions of unseen foes, the various micro-organisms, the principles of serum-therapy were applied empirically. Jenner, the modest English physician, for example, with his vaccination for small-pox, laid the foundation for modern serum-therapy. Pasteur, the great French chemist and bacteriologist, initiated the work of building upon this foundation the superstructure of preventive medicine. Koch, Toussaint, von Behring, Kitasato, and many others, have added their contributions, and the splendid work still advances. Some of the scourges which formerly swept the country have lost much of their terror. It may be confidently hoped that in the near future others will be added to this list, and that man, armed with scientific knowledge and earnest purpose, will gain complete mastery over the invisible hordes of disease.

Naturally, advance along the line of preventive medicine has not been unattended by difficulty and error. Much remains to be clarified, but the public at large may be confident of the honesty and sincerity of purpose on the part of the scientific world. Each one should lend his or her quota of help to the great work of saving and prolonging life by maintaining the attitude of "suspended judgment" with reference to measures which are of necessity still in the experimental stage. When this stage is passed, when, from experience and observation, the medical profession and the scientific world at large have set the seal of approval upon a given phase of serum-therapy, the beneficent work should not be hampered by the public giving ear to antagonistic, unscientific, and ofttimes irrational, statements which cannot be substantiated by facts.

Vaccination.—At the present time there are many who still denounce the practice of vaccination for small-pox, despite the thousands upon thousands of lives which have been saved thereby during the century and more since it became an established preventive measure. There are yet many who denounce the practice, with extravagant statements which cannot be substantiated concerning the greater mortality caused by vaccination than by small-pox itself.

Lady Mary Wortley Montagu, in the early part of the eighteenth century, introduced into Europe the Eastern practice of inoculating healthy persons with the virulent virus from the pustules of small-pox patients, thus rendering the former immune to the disease. She proved her faith in the procedure by employing it upon her son, for which action and its advocacy she was severely criticized.

When Jenner, in 1798, made his wonderful discovery that by substituting the virus of cow-pox for that of small-pox the latter terrible disease could be prevented or its severity lessened, his theory was called Utopian by some, while very much harsher epithets were applied by others. And yet, those who have studied the statistics of small-pox before that time, and who have traced the history of the disease since, know full well that Jenner's prayer has been answered, that "in God's good Providence, 'it might be his lot to stand between the living and the dead, and that through him a great plague might be stayed.'" When finally he had abundantly proved his theory, when the attention of the civilized world was directed to his work, he was offered fame and fortune if he would go to London, but he rejected both. "Admitting," he said, "as a certainty that I obtain both fortune and fame, what stock should I add to my fund of little happiness? And as for fame, what is it? A gilded butt forever pierced by the arrows of malignancy."

How well his estimate was made can be realized at the present time by the vituperations of the "anti-vaccinationists."

When the mind reverts to the appalling loss of life from this loathsome disease in almost every quarter of the globe before Jenner's time, to the fact that three-fourths of the indigent blind were formerly rendered so by small-pox, and to the gradual decline in frequency and severity of epidemics of the disease,—it seems passing strange that one should be left among the enlightened to raise a voice against this life-saving preventive measure. "Human lives have been saved and human life prolonged to such an extent that it is impossible to estimate the benefits that mankind has derived from the genius and devoted patriotic labors of one man."

Successful vaccination, that which "takes," immunizes the person for from five to ten years. To be sure of protection, everyone should be vaccinated once in six or seven years.

Healthy infants may be vaccinated within the first six weeks or two months of life, and at any earlier time if exposed to the disease. Children who have not been vaccinated in infancy should be subjected to this precautionary measure before entering school. In some European countries the law requires the vaccination of all children within the first few months of life, and at proper intervals thereafter.

Diphtheria Antitoxin.—The germ which causes diphtheria (*Bacillus diphtheriæ*) was discovered in 1883. A few years later it was found to secrete a powerful, specific, soluble toxin, which can be separated from the bacteria themselves by filtration. The employment of this filtered toxin for the purpose of immunizing against the germ followed, and thus the antitoxic treatment of diphtheria has been evolved.

So successful has been this method of dealing with the disease that the mortality record has been markedly lowered since its introduction in 1896. It has caused a reduction in mortality of more than fifty per cent. Professor Welch, of Johns Hopkins Hospital, found that out of a very large number of diphtheria cases there was an apparent reduction of case-mortality of 55.8 per cent. Where the antitoxin was employed in the first three days of the disease the mortality was only 8.5 per cent. in over 1100 cases, as against 30 per cent. or higher under the older methods of treatment. Chicago Health Department statistics show that, despite the great increase in population, the yearly deaths from diphtheria dropped from 1423 in 1886-1895 (before the introduction of antitoxin), to 433 for the period from 1896-1905 inclusive. The United States Census reports show a reduction in death-rate from this disease from 1890-1905 of from 70.1 to 19.9 per 100,000, or over two-thirds.

The opponents of the use of antitoxin for diphtheria urge against it the belief that it favors the development of diphtheritic paralysis. If it be true, as is sometimes claimed, that the percentage of those who suffer from paralysis has increased, it is not due to any evil effects from the use of the antitoxin, but to the fact that an increasingly large number of severe cases (those which most frequently develop paralysis) are saved by the employment of this measure.

The application of one phase or another of serum-therapy is now being made to a number of diseases other than small-pox and diphtheria. Hydrophobia, tetanus (lock-jaw), cerebro-spinal meningitis, tuberculosis, typhoid fever, cancer, and various other affections of known as well as unknown etiology, have been or are being experimented with along these lines. Whether the application of the principles involved be made for preventive or curative purposes, if successful, it affects individual and communal health, and is, therefore, a factor in the production of long life.

Common Carriers of Disease.—In quoting the familiar words, "A man's home is his castle," it must be remembered that there may be many points of weakness at which the fortress may be attacked by the enemies to health and happiness.

The dust storms which sweep up town from the alley and the slums may fan the face of the baby of the avenue and the palace.

The maid who cares for the precious child in the castle home may spend her "day out" in places where disease germs are most prevalent.

The pet animal which gives so much joy to the child who fondles and loves it may bring to its little owner germs of contagious disease, or, in turn, take to others some infection from the home where it belongs.

Over-ripe fruits and stale vegetables, which are practically in a state of decomposition, may be the source of contamination by various parasites, vegetable as well as animal.

Many facetious statements and comic pictures have appeared from time to time in the secular press anent the "antiseptic fad." Man has been described as living in a house fashioned after the most modern hospital operating room, with polished glass or shining tiled walls and fixtures. The docile cow has been pictured as standing patiently while her teeth are being brushed with sterilized brush and water. The piano, in some of the current literature, has been sprayed with formaldehyde, while the pets of the would-be aseptic household are carried through the complicated maze of sterilization to which the most fastidious surgeon about to perform some major operation would resort.

Such literature may truthfully be said to be serio-comic, for, while it is primarily intended to appeal to the risibilities of the reader, it carries with it an undercurrent of serious import. The common carriers of disease lurk around us everywhere, and while we cannot eliminate them all, we should at least endeavor to take reasonable precautions toward checking their inroads.

The common sources of possible infection with which we come in contact in daily life may be summarized as follows: (1) ready-made clothing; (2) household pets; (3) flies and other insects; (4) air; (5) dust; (6) sputum; (7) fine particles of saliva thrown off in coughing and talking; (8) drinking cups and various table utensils; (9) towels, bedding, etc.; (10) food of various kinds; (11) milk; (12) water.

Physiological Epochs.—Certain physiological epochs, fraught, as they are, with many dangers to the individual, are often ignored and their effects attributed to other causes. Moral and mental cyclones frequently result from pathological conditions superimposed upon these physiological periods. Puberty, the child-bearing period, the climacteric, are all times in a woman's life which are attended by dangers, physical, mental, and even moral. It behooves those most closely associated with the girl or woman under these circumstances to exercise a wise and patient watch-care. Many of the eccentricities of young womanhood—and older womanhood as well—can be traced to these periods of physiological transition, and instead of thoughtlessly criticising the conduct of those who are passing these crises, a large measure of patience and consideration should be accorded them.

What is true of the girl at puberty is true of the boy at the corresponding age of his life, and what is true of the woman who is nearing the last of these physiological epochs, is claimed by those who have made a study of the question to be equally true of men of fifty to sixty years of age. The exercise of patience, sympathy and wisdom on the part of those associated most intimately with the man or woman under these trying circumstances will many times carry them safely through the cyclone, be this physical, mental or moral.

PSYCHIC CONSIDERATIONS

The psychic side of life is much broader than is sometimes considered. Taking the Greek meanings of the word *psyche* (ψυχή), —the breath, life, soul, spirit; mind, reason, understanding; sagacity, instinct; disposition, the affections; a man, person, creature, etc.,—it will be seen that the mental, moral and spiritual are embraced under the one term. Indeed, so intimately are these interlinked, one with the other, and all with the purely physical, that it is impossible to draw fine lines of differentiation. This further emphasizes the importance of maintaining that perfect equilibrium, that balance of the powers, of which we have already spoken. Success, happiness, generosity, kindness, courage—all the range of human interest and endeavor—are involved in the psychic life of the individual.

The perfect mind is the open mind, the mind ever ready to grant unto others the freedom demanded for itself; the mind that does not always say "I know," but "I desire to know"; a mind free from prejudice and perversity; a mind that tries, however much it may fail, to "know the infinite life that all men live."

"The Mind's Diet".—The importance of a change of mental pabulum has been expressed in characteristic vein by Oliver Wendell Holmes:

"No life worth naming ever comes to good
If always nourished on the self-same food;
The creeping mite may live so if he please,
And feed on Stilton till he turns to cheese,
But cool Magendie proves beyond a doubt,
If mammals try it, their eyes drop out.

"No reasoning natures find it safe to feed,
For their sole diet, on a single creed;
It spoils their eyeballs while it spares their
tongues,
And starves the heart to feed the noisy lungs."

Keep the Mind Occupied.—It is not necessary to remind our readers that the "idle brain is the devil's workshop." That there are idle brains we are all too well aware. It should be a part of our duty in life to put those brains to work.

If this should chance to come to the attention of one who has no definite occupation for his or her brain, no special life work upon which to bestow the mental energies, to such a person we would say, "Get a hobby, if you can do no better, and ride that hobby to the best of your ability!" The ability to ride a hobby successfully signifies ability to do more than that. Interest in one's own hobby often leads to interest in the hobby of one's neighbor, and thus, to this extent, enlarges the mental horizon.

No Age Limit to Mental Vigor.—The two "fixed ideas" of Dr. Osler, of which so much has been said in both the secular and the medical press, since he delivered his now celebrated pronunciamento, have caused incalculable harm among those who have taken him seriously—which no one should have done.

A glance along the line of the world's great men and women reveals a multitude of names of those whose history refutes the notion that mental vigor is subject to so rigorous a time limit. Aristotle continued his philosophic studies as a pupil until he was thirty-seven, and was fifty-three before he established a school of philosophy at Athens. Plato was forty before he ceased his philosophic studies as a pupil, and he did not begin to teach philosophy until he was about fifty. In each case much good work was accomplished after the so-called Osler age limit. Lincoln was trying for an appointment as land commissioner, in which he failed, at the age when so arbitrary a limit, if applied, would have consigned him to the company of the outworn and unfit.

In daily life everywhere there may be seen many examples of mental vigor not only retained but developed after the sun has passed the meridian of life. The case has come under my notice of the mother of a large family of children, always a home-keeper until well on in her fifties, when occurred her husband's death and the marriage of the children. She did not then resign herself to a life of inactivity, but studied and passed the State board school examination, secured a teacher's license, and became the head of a village school of a hundred pupils. At the same time she conducted a night school for working men, one of whom she prepared for a theological seminary. Now, at sixty-seven, this active woman is the able teacher of a large class in a summer school connected with one of the leading Southern universities.

Another interesting example is that of an enthusiastic Chautauqua woman who began the study of Greek when three years older than the eighty years at which Cato is said to have learned that language. She has since donned the green star of the Esperantists.

Governor Allen, of Ohio, in commenting upon the decision of some of the railroads and other corporations to employ no men over thirty-five, said, "It is not how long a man has lived that counts, it is what is left in him."

Psycho-therapy.—The influence of mind over body has long been a subject of interest to students of psychic phenomena. Cult after cult, combining in varying proportions the religious with the healing elements, has been founded upon this idea, and the so-called "New Thought" seems, at the present time, to be pervading every stratum of society. The "thought" is by no means "new," nor is its application to the healing art of very modern origin. It has merely been crystalized, so to speak, into more definite expression and dignified as this or that "ism" or "movement."

As the physiology of the mind has become more and more thoroughly comprehended, naturally a better understanding of its pathology has developed, and along with this there has been evolved what is aptly termed a system of "psychic pedagogy." While this "re-education of the reason" has found its most brilliant expression in the treatment of psycho-neuroses (neurasthenia, hysteria, hypochondria, melancholia, and certain serious disturbances of mental equilibrium which border on insanity), it is by no means to be inferred that it is not applicable in many other conditions, in functional and organic diseases, and even in surgery.

As Dubois has pointed out, "Moral influence nearly always comes in, and ever since medicine has existed patients and physicians have been able to prove it. It is not unusual to see the patient's condition improve immediately after the visit of the physician, either as a consequence of the favorable assurances that he has expressed, or from the sympathy which he shows to his patient. This psycho-therapy has existed through all time. To know how to apply it has always been the highest quality of those practitioners who are also physicians of the soul."

While psycho-therapy, "suggestive therapeutics," "suggestion," or whatsoever title one chooses to apply, has long been recognized by the medical profession as a valuable adjunct to treatment, it cannot be denied that its application by those who are unfamiliar with physiological and pathological processes may be attended with grave danger. Physicians know that it is difficult, at times impossible, to draw clear and distinct lines between diseases which are "functional" and those which are "organic," and if the physician cannot do so, certainly no layman, however intelligent in other directions, should presume to make such a diagnosis and to advocate a line of treatment.

Aside from the actual treatment of certain disorders by resort to mental suggestion, the fact remains that each one forms a part of the mental atmosphere of his neighbor, influencing for good or ill not only the psychic but the physical life as well. The member of the family who comes to the breakfast table in a gloomy mood not only fails to receive the full benefit of the food consumed, but the chances are that he upsets to a greater or less degree the mental equilibrium and the digestion of the other members of the family.

We have noted elsewhere the effect of the mind over digestion and assimilation. In like manner the mind influences many other functions of the body. It is well known that to look upon or to smell appetizing food stimulates the action of the salivary glands, and causes the mouth literally "to water." Public speakers are aware of the fact that the action of the salivary glands is checked by the excitement of the appearance before an audience, and hence, the dryness of the lips, tongue and throat. Physiologists have noted that the mind exercises an influence over the circulation to a certain extent, the heart beating faster under the excitement of grief, joy, fear or anger. For all these reasons it behooves everyone to cultivate mental poise, the perfect mastery of one's self, without which the maintenance of physiological equilibrium is difficult.

To this extent each member of society is a psycho-therapist, responsible, to a much greater degree than is realized by many, for his own and his neighbor's mental, moral and physical well-being.

Cheerfulness.—It is hardly necessary to say to the mind occupied in wholesome work, "Be cheerful,"—cheerfulness follows wholesome activity, "as the night the day." The habit of cheerfulness can be acquired if it be not inherited, and once attained it should be assiduously cultivated until it becomes second nature. A plain face full of sunshine is always more beautiful than the sullen countenance, though formed on the most classic lines. However great and ever-present our own troubles may be, let us not forget that others may be even more bowed down by the weight of woe; let us not add our own to our neighbor's already great burden. The habit of worrying is easily fallen into, and once acquired is hard to break. Furthermore, worry spoils the appetite, while cheerfulness is the best aid to digestion.

During his Samoan life of suffering Stevenson prayed for the "morning face." One of the many new organizations is that of the "Morning Smile Society." May it prosper and have many members join its ranks!

Hopefulness.—Hope is the natural outcome of the cheerful mind occupied in wholesome labor. If, however, along the voyage of life the storms have been many and severe, so that it has seemed as though the harbor would never be reached, be not discouraged—

"The dreamers who gaze while we battle the waves
May see us in sunshine or shade;
Yet true to our course, though our shadow grow dark,
We'll trim our broad sail as before,
And stand by the rudder that governs the bark,
Nor ask how we look from the shore!"

Success.—"It is one of the last lessons one learns from experience, but not the least important, that a heavy tax is levied upon all forms of success; and that failure is one of the commonest disguises assumed by blessings." Success and failure are often so intimately associated that it is impossible to differentiate one from the other. A so-called failure may prove the gateway to the highest success.

Let us not think of the successful men and women of the world as only those who have fought great battles, who have written great books, painted great pictures, or who have accomplished some work which the world at large calls great. In whatever sphere their lots may be cast, those who have made the most of their lives are truly great. Publicity is not synonymous with success. To live a useful and a normal life, and to have devoted that life, full of effort, to the betterment of others, is an ideal worthy the best endeavor. The mother in her humble cottage home, who, in the midst of her manifold duties, croons her tired child to sleep, sings a song that strikes the ear of the old world as

> "Music that gentlier on the spirit lies,
> Than tir'd eyelids upon tir'd eyes."

The busy world may not stop to listen to such a song, but, somehow, it is made better by it.

After all, success in life is but

> "To bear unflinching witness to the truth,
> All true whole men succeed; for what is worth
> Success's name, unless it be the thought,
> The inward surety, to have carried out
> A noble purpose to a noble end."

PART V

TWILIGHT

“ The best is yet to be,
“The last of life, for which the first was made.”

CHAPTER XIII

TWILIGHT

WHEN the meridian of life is reached and the face is turned toward the setting sun, there is often a long period of happiness and usefulness in store for the traveler who has successfully weathered the storms of the earlier day. The latter part of the journey is attended with its own peculiar possibilities for health, happiness and helpfulness, and it is fraught with its own peculiar difficulties and dangers. The attainment of the former and the avoidance of the latter engrossed the attention of philosophers of old, and are receiving much study upon the part of scientists to-day.

Motive for the Study of Old Age.—The Elixir of Life and the Fountain of Perpetual Youth have been sought in vain, and man has come to realize, perforce, that in the natural course of events this earthly life must end. He no longer seeks to be perpetually young, or to restore youth once it is lost; the wise man accepts the inevitable, and endeavors so to live that his last years will, in reality, be the best, "for which the first were made."

The motive for the study of old age, whether from the scientific or philosophic point of view, is not merely the prolongation of life for the sake of living long; it is rather the hope of finding some means of increasing the period of maximum usefulness, of prolonging mental and bodily vigor, and of lightening the weight of years to such extent that old age, no less than youth and middle life, may be healthy, happy and useful.

Professor Elie Metchnikoff, Director of the Pasteur Institute of Paris, who recently shared with Dr. Ehrlich the Nobel Prize for medicine, is quoted as saying that he intends expending the money "in continuing his efforts to discover how the body can get its chance, so to speak, and how it can be prevented from being needlessly sacrificed in early youth—comparatively, that is—at 70 or 80 years of age, when it ought to hold out until it is 150."

What is Old Age?—An understanding of the processes involved in growing old is essential to a scientific study of the retardation or modification of the ravages of the "gnawing tooth of time." Men of science have, accordingly, set about in a systematic manner, by experimental methods, to study what has been called the "mechanism of senility." On the one hand are those who view the subject from the strict biologic side, who call old age "merely the advanced and final stage of cytomorphosis" (cell-change); on the other are those who consider the matter rather from the medical side, and who see in old age, as it is commonly understood, a chronic, incurable disease. Many others, neither biologists nor physicians, have studied the question from their respective points of view, with the hope of alleviating some of the unpleasant features of the latter years of life, but to these we shall not devote our attention at present.

The Biologic Theory.—The medical conception of old age is deprecated by Charles S. Minot, Professor of Comparative Anatomy, Harvard Medical School, in his book, "Age, Growth and Death." From his biological studies and experiments he is convinced that it is purely a physiological process, a continuation of the succession of cellular changes which go on in the body,—changes which are always progressive, beginning with the earliest development, continuing through youth, still perpetually occurring at maturity and in old age. These changes manifest themselves in differentiation, degeneration, and death, "natural death" being the final consequence of this cellular differentiation. Not only does this cellular change eventuate in the death of the individual cell, as is seen in the "scarf skin," for example, which dies and is thrown off, but it also culminates, in time, in "general death," "when the continuation of the life of the individual ceases, and is thereafter bodily impossible."

In the earliest stage of development the cells are undifferentiated, "embryonic" cells, all alike. Multiplication takes place by segmentation, each cell dividing into two, each of these new cells into two more, and so on. These soon begin to undergo differentiation into nerve-cells, blood-cells, muscle-cells, etc., until, in time, in place of the uniformity of the embryonic cell, there is the diversity of the fully formed infant. Development, then, is "in reality nothing more than the making of diversity out of uniformity."

The process does not stop here, however. After development has been accomplished, when perfection of structure is attained, there is a tendency to still further change, and this the biologist calls degeneration. If, under the altered conditions incident to all these changes, the cell is unable to keep up its nourishment, there is a gradual shrinkage, which is called atrophy. This may go on to a stage when the cell is dry—the horny stage of the skin, for example—when it may be called dead. It is now thrown off to make way for new cells, and thus a "life in death" process is continually going on in the body. Various other changes may take place in the cells, and the young cells may reach their death by accident rather than in the natural manner.

The changes which take place in the cells of the body are, according to Minot, far more rapid in infancy than in age. "We start out at birth," he says, "certainly with less than two per cent. of the original growth power with which we were endowed. Over 98 per cent. of the loss is accomplished before birth—less than two per cent. after birth." This, he acknowledges, is very different from the conception of the process of development based upon an acquaintance with the growth and progress as ordinarily observed. "We overlook the fact," he tells us, "that the progress which each individual makes is the result of accumulation. It is as if money were put into the savings bank; it grows and becomes larger, but the rate of interest does not alter. So, too, with us; we see there is an accumulation of this wealth of organization which gives us our mature power. But as that accumulation goes on, our body seems to become, as it were, tired. We may compare it to a man building a wall. He begins first with great energy, full of vigor; the wall goes up rapidly; and as the labor continues fatigue comes into play. Moreover, the wall grows higher, and it takes more effort and time to carry material up to its top, and to continue to raise its height, and so, as the wall grows higher and higher, it grows more slowly and ever more slowly, because the obstacles to be overcome have increased in the very height of the wall itself. So it seems with the increase of the organism; with the increase of our development, the obstacles to our growth increase."

This loss of "growth power," which results in old age, is due to changes in the structure of the body itself. These changes, to which the term *senescence* has been applied, consist, according to Minot, in the growth and differentiation of the *protoplasm,* the essential substance of the cell, the physiological basis of life. It affects the relation of the protoplasm to the *nucleus,* that portion of the cell which provides its nutrition. The protoplasm increases and the nucleus decreases during the period of senescence. The cell when young can grow rapidly and multiply freely,—capacities which are impeded and finally lost as age advances. If the cell-change has been rapid, the final stages of differentiation—old age and death—are reached early; if it is less rapid the end is delayed and the span of life lengthened.

The question then naturally arises from this theory, "How can old age be delayed?"

The biologist offers no new rule for the accomplishment of this desired object. Minot, however, ventures to suggest that in the future deeper insight into these mysteries probably awaits us. "If it be true that growing old depends upon the increase of the protoplasm, and the proportional diminution of the nucleus, we can, perhaps, in the future find some means by which the activity of the nuclei can be increased and the younger system of the organism thereby prolonged."

The Medical Theory.—The greatest exponent of what has been termed the medical theory of old age is Metchnikoff, "an expert of experts on the science of life." He has spent forty years or more in patient research in an endeavor to better understand the "mechanism of senility." With such knowledge in hand, he has sought to discover the means of so improving this mechanism that not only will life be prolonged, but old age will be rendered more a period of active usefulness, in which the great experience that has come with the years can be utilized for the good of all.

Metchnikoff holds that growing old is a pathological, not a physiological, process, and that what we call old age is a disease rather than a normal condition. He predicts that in a hundred years physicians will treat and cope with this condition as they now do with typhoid fever or whooping cough.

His views have not been generally accepted, particularly by those who have studied life from the strict biologic side. As the result of his investigations, however, a note of optimism has been sounded which is quite in contrast to the bugle-blast of pessimism which has recently been sent reverberating throughout the land.

The first attempt to form a picture of the details of senile degeneration was made by Merkel, a German anatomist, in a paper read before the International Congress of Medicine at Berlin in 1890. This author endeavored to show that certain of the tissues of old people, for example, the skin and mucous membrane, preserve their youthful character to the end, whereas, others, such as the connective tissue, undergo profound changes. Metchnikoff considered that this description did not go far enough, and so he made an attempt to complete the work, making use, in so doing, of the published results of all those who had studied senile degeneration. He summarized his conclusions thus: "In senile atrophy the same condition is always present: *the atrophy* *of the higher cells of a tissue and their replacement by hypertrophied connective tissue.*" In the brain the nerve-cells,—the higher cells,—whose function is manifest in intellectuality, in sensation, in control of motion, disappear and are replaced by elements of a lower kind,—a connective tissue of the brain. In the liver, the kidneys, and the various organs, similar changes take place. "In other words," he says, "a conflict takes place in old age between the higher elements and the simpler or primitive elements of the organism, and the conflict ends in the victory of the latter. This victory is signalized by a weakening of the intellect, by digestive troubles, and by lack of sufficient oxygen in the blood. The word conflict is not used metaphorically in this case. It is a veritable battle that rages in the innermost recesses of our beings."

For the full details of this most interesting "battle," as described by Metchnikoff, the reader is referred to his "Nature of Man," and "The Prolongation of Life." A glance at this battle will suffice for our present purpose.

In addition to the highly differentiated essential cells of the various organs and tissues of the body, there are distributed throughout every portion of the organism certain cells having a special function of their own. They are not "fixed," as are other cells, but are capable of independent movement, thus being able to fulfil their peculiar function of protecting the organism against germs and other harmful intruders. These are the soldiers of the army of defense, which congregate in vast numbers and fight the battle royal when the body is attacked by the enemy—the hordes of disease-producing germs. They have the power of literally eating alive the various microbes, and this property has gained for them the name of phagocytes, or "eating cells." These cells are of two kinds—microphags, small active phagocytes, and macrophags, larger phagocytes. The former, in a general way, may be said to destroy germs, and the latter to heal mechanical wounds. Thus, in the warfare in the body, there is a division of labor among the soldiers.

When the forces of the enemy—the disease-producing germs—enter the body and begin to manifest their presence by elaborating poisons whose baneful influence, if unchecked, results in pathological old age, or in death before old age is reached, the phagocytes rally to the defense of the body. It is then a battle to the death. If the body is in good condition and the phagocytes are well nourished, the enemy is apt to be routed, their poisons eliminated, and the body is restored to health. If, on the other hand, the body is weak, emaciated, and in generally poor condition, the army of defense works at a disadvantage, and the enemy will probably win the battle. In fact, there comes a time when the law of self-preservation seems to apply to these guardians of health, and, finding their food supply insufficient, they turn upon their neighbor-cells. This is particularly true in old age. The phagocytes, particularly the macrophags, now initiate an internecine warfare; they destroy the higher cells of the body, and leave in their place lower elements—connective tissue. What is the result? The muscles of the body wither, the arteries harden, and the various organs lose, in part or in full, their function. In other words, there are set in operation the many processes of deterioration which are the usual accompaniments of the weight of years, and which, continued, eventuate in death.

Unlike the biologists, those who agree in whole or in part with the so-called "medical" theory of old age have many suggestions to offer for staying its processes.

The direful work of the harmful elements, according to Metchnikoff, is the outcome of various "disharmonies" of the organism with its environment—imperfect adaptation of certain structures to the functions of the body as a whole. For example, he holds that man, in his present state of development, has a large intestine which is too large and too long for his needs. "In the problem of his own fate," he says, "man must not be content with the gifts of nature; he must direct them by his own efforts. Just as he has been able to modify the nature of animals and plants, man must attempt to modify his own constitution, so as to readjust its disharmonies."

PREVENTABLE FACTORS IN THE PRODUCTION OF OLD AGE

The readjustment of man's constitution, with its rudimentary organs, its too long and too large intestine, and various other "disharmonies" to which Metchnikoff refers, is by no means an easy task. If the intestine as it now exists in man is larger than he needs for purposes of digestion and absorbtion, so that much food may be left in it to undergo fermentation and putrefaction, he cannot very well rid himself of this unnecessary part of his anatomy. The rudimentary part, the appendix, may be eliminated, and with it the danger of appendicitis, but not so the remainder of the intestine. He must, therefore, endeavor to regulate his food supply so that the harmful retention in the intestine does not occur, *Intestinal Fermentation and Putrefaction.*—According to Edgren, Merkel, Metchnikoff, and others, many of the diseases of age may be accounted for by the poisons elaborated in the intestine by myriads of microbes. Strassburger has estimated that these microbes increase at the rate of 128,000,000,000,000 each day. By eliminating, as far as possible, the poisons to which they give rise, much will be accomplished toward overcoming many of the conditions which are conducive to old age. Since the growth of these micro-organisms is facilitated by the undigested food in the intestine, the importance of keeping the alimentary tract clear and in good condition is obvious. By correcting errors of diet, thereby lessening the deadly work of the germs of putrefaction, which are present in such enormous numbers in the intestine, health will be maintained and life lengthened.

Having observed the wonderful hardihood and the remarkable record for longevity of the Roumanians and Bulgarians, Metchnikoff, Merkel, and others, began to study their habits of life, and to experiment with the chief article of diet among them, the "yaghurt" or "kefir," a sour milk, which they consume in enormous quantities. It was found that by consuming sour milk sufficient numbers of the germs which cause the souring of milk (lactic acid bacilli) are transplanted to the intestinal tract to overcome the deadly work of the germs of putrefaction, which, according to the ideas of these investigators, are most concerned in bringing on old age. They found that it is possible in this way "to transform one's intestinal flora from one that is savage to one that is cultivated."

Following this line of study, other interesting theories looking to the prolongation of life have been or are being evolved, the details of which are not within the scope of this book.

The Bulgarians and Roumanians, who live in accord with the ideas of Metchnikoff and his co-workers, show the greatest number of centenarians in proportion to population of any of the countries of the world.

Roumania, with a population of 6,500,000, has 1084 centenarians, while Bulgaria, with less than 4,000,000 inhabitants, has 3883. Spain shows 410 such individuals out of a population of 18,000,000. France, with a population of 40,000,000, has 213, while Germany shows less than 80 centenarians out of a population of 55,000,000. England, with 28,000,000 inhabitants, has 146 persons who have passed the century mark. Coming nearer home, we find that in New York State, during the decade from 1871-1880, 126 centenarians died, and from 1880-1899, inclusive, 68 died, including one who was 116 and one 124 years of age.

Arterial Sclerosis.—Professor Osler has said, "Longevity is a vascular question, and has been well expressed in the axiom that a man is only as old as his arteries." This idea has largely dominated the medical conception of old age, which has been summed up in the one word, "atrophy." Arterial sclerosis is only one of the so-called "atrophies" of old age, but because of its far-reaching influence it has received much attention from all students of senility and its accompanying diseases. The hardening of the walls of the arteries interferes with the circulation of the blood, this, in turn, interferes with the function of every part of the body, and general deterioration is the inevitable outcome.

In a "Monograph on Arterial Sclerosis," Edgren claims that one case in every five of hardening of the arteries is caused by syphilis, and chronic alcoholism causes twenty-five per cent., these two factors producing nearly one-half of all these cases. The other instances of arterial sclerosis, in which no known cause can be found, Edgren considers traceable to the poisons elaborated by the germs of putrefaction in the intestines—in other words, they are the result of errors in diet.

Other Diseases of Old Age.—Charcot, the eminent French physician, who made a thorough study of the diseases of old age, said: "Old age seems in some respects to create pathological immunities. Eruptive fevers, typhoid fever and phthisis, are little known at this age. Still these immunities must not have their importance exaggerated, for they are far from absolute." While relatively immune to some diseases, old persons are particularly liable to certain forms of cancer, to rheumatism, gout, palsy, locomotor ataxia, and, as we have seen, arterio-sclerosis.

FACTORS CONDUCIVE TO LONGEVITY

Habits of Life.—While the essential cause of some of the diseases to which the aged are particularly liable is still in doubt, it is the consensus of opinion among medical men that even in rheumatism, gout, diabetes and the like, habits of life play a most important part. Benjamin Franklin realized this when he gave his terse recipe for lengthening life:

> "Against diseases known, the strongest fence
> Is the defensive virtue, abstinence."

In a series of one hundred cases of very long-lived persons, Dr. Hermann Weber found that the majority were temperate; small eaters, lived much in the open, led an active life, many a life of toil, with great restrictions as to food and comforts; that most of them were early risers; that a great number of them had a joyful disposition, and performed their work cheerfully; and that only a few were intemperate or idle or lazy persons.

Solomon's advice, "Go thy way, eat thy bread with joy, and drink thy wine with a merry heart," shows that he appreciated the influence of the mind on digestion and assimilation.

The admirable sanitary code of Moses has done much, indeed it has done more, perhaps, than any other one thing, to render the Hebrews the sturdy race they are to-day, despite the fact that in the larger cities the Ghetto is usually the most densely populated and often the filthiest section of the city.

Exercise.—As age advances people are inclined more and more to give up exercise in the open air. This is not as it should be. "Old persons," says Weber, "accustomed to much exercise may go on taking it *as* *long and as much as agrees with them,* and need not think of the number of their years; but they must keep up the habit if they wish to keep up their power." Walking, riding, golf, and various outdoor games help to maintain health and vigor. Exercise assists in counteracting senile atrophy by supplying the tissues and organs with healthy blood, and by keeping the blood vessels elastic. It also facilitates the removal of the waste products of the tissues, thus preventing auto-intoxication and its many evil consequences.

Correct Diet.—Reference has been made to the evil consequences of the prolonged retention of food in the intestines. If food is taken in proper amount to support the needs of the individual, and in quality according to one's requirements, there is little danger of this retention and the consequent putrefaction. Inasmuch as there is no tissue-building in old age, there is not so much need for proteid food, the tissue-builder. There is need, on the other hand, for carbohydrates, which, as we have seen, produce warmth and energy. Therefore old people should eat sparingly of red meats, and liberally of white meats, fish, green vegetables, and fruits. Sir Henry Thomson claims that half of the chronic diseases of advancing years are due to dietetic errors. "Indigestion," he says, "denotes not a disease but an admonition. It is the language of the stomach"—a language the majority of those to whom it is addressed do not understand or heed.

Addison strongly recommended exercise and temperance. "The apothecary," he said, "is perpetually employed in countermining the cook and the vintner." Referring to the story of Diogenes, who, meeting a young man on his way to a feast, rescued him from the impending danger by taking him home, Addison wondered what the old philosopher would have said had he been present at a modern meal. "Would not he have thought the master of a family mad, and have begged his servants to tie his hands, had he seen him devour fowl, fish, and flesh; swallow oil and vinegar, wines and spices; throw down salads of twenty different herbs, sauces of a hundred ingredients, confections and fruits of numberless sweets and flavors? What unnatural motions and counterferments must such a medley of intemperance produce in the body! For my part, when I behold a fashionable table set in all its magnificence, I fancy that I see gouts and dropsies, fevers and lethargies, with other innumerable distempers, lying in ambuscade among the dishes." It cannot be claimed that the diet of man has been greatly simplified or improved in the two hundred years since these words were written.

Moderation, not only in diet, but in the use of stimulants,—alcohol, tea and coffee,—and tobacco, is especially important in advanced life.

Progress in Medicine and Surgery.—The annual average number of deaths in New York City during the decade from 1850-1859 inclusive was 22,223, and the death-rate was 35.2. Forty years later, during the decade from 1890-1899, the average number of deaths annually was 41,802, and the death-rate 22.9. If the death-rate of the former period had prevailed during the latter, there would have been 64,170 deaths a year instead of the actual number, so that there has been a saving of nearly 25,000 lives during the ten years. Not only in New York City and State is the death-rate said to be decreasing, but the same applies to every civilized country. And yet, according to the Committee of One Hundred, "Two millions of human beings die each year, mainly because they cannot find out how to live."

This saving of life has been brought about by various agencies. Improved sanitary conditions; the recognition of the importance of cleanliness, both municipal and personal; the just appreciation of the value of pure air, good food, and pure water; the better understanding of the beneficent influence of sunshine in all ages and in all conditions, both in health and in disease,—these are some of the many factors which have not only saved life, but which have added to the length of life.

The introduction of anesthesia, local and general, has saved thousands of lives by rendering possible serious operations which in the past would have been impossible.

The progress in medicine and surgery has been accompanied by better housing, better ventilation and light, better food and drink—in fact, with our tenement house commissions, philanthropists, and visitors who study intimately the question of environment among the poorer classes, the general standard of living has been raised. All this tends to lower the death-rate, and should also conduce to longevity.

Preventive Medicine.—One of the most important factors, as we have already seen, in the saving of life and adding to the number of years, is the wonderful and recently developed science of preventive medicine. No department of medical science has made more rapid strides within the past few years, no department is making surer headway today.

The pioneers in this field of endeavor have met with stubborn opposition in some quarters, but they, and those who have followed in their lead, have forged ahead regardless of the flings and arrows of enemies to progress both within and without the ranks of the medical profession.

From a study of health board statistics it will be seen that the reduction in mortality consequent upon improved sanitation and the control of contagious and infectious diseases, applies to those under forty-five and not to those beyond that age. The death-rate of persons from fifty-five to sixty has not decreased during the last thirty or forty years. Ninety per cent., approximately, of deaths of persons more than forty-five are caused by alcoholism, pulmonary tuberculosis, diabetes, apoplexy, diseases of the heart and blood vessels, diseases of the respiratory organs, affections of the kidneys and bladder, or from accidents of various kinds, and old age. The death-rate from cancer alone in New York City has nearly doubled in the last thirty years.

While there is reason to believe that, under the gradually increasing tension of the world's progress, the span of life has shortened since the time when it was said, "yet his days shall be an hundred and twenty years," there is evidence to show that during the nineteenth century the mean of life has increased.

Progress in Dentistry.—Along with the improvements in medicine and surgery have come wonderful advances in the sister science of dentistry. To the dentist must be given the credit of preserving the teeth so skilfully that the usefulness of these organs of mastication, and, partly in consequence, that of the organs also of digestion, has been greatly prolonged, even into extreme old age. In many cases, however, the dentist has builded better than he knew, and the waning powers of digestion have been overtaxed through the ability of those of advanced years to masticate heavy meats, pastries, etc., instead of confining their diet to the softer and more digestible foods formerly accepted as the appropriate diet of advanced years.

Auto-suggestion.—In an article published recently on "The Will as a Means of Prolonging Life," Jean Finot says: "The forces of the soul, properly directed, can render us wonderful service in the matter of prolonging life. Auto-suggestion—the power of the will used with conscious effort to a given end—can prolong life. Auto-suggestion, improperly directed or abused, shortens life. On reaching a certain age, with a long record of shattered ideals behind us, we voluntarily . . . give way to the overwhelming idea of approaching dissolution. We lose confidence in our strength and powers. Under the pretext that old age lies heavily upon us, we adopt sedentary habits and lead idle lives. By degrees the blood becomes vitiated; tissue refuses to re-create; the body becomes a prey to all kinds of illnesses to which inactivity has predisposed the system. Old age, in fine, comes upon us long before it is due, and solely because we have abused our powers of auto-suggestion." "On a closer study of centenarians," he adds, "we perceive how an optimistic belief in their strength has helped them to bear the weight of their years." He cites the case of Baron Waldeck, who died in Paris in 1875, at the age of 109, and who never ceased to entertain the "suggestion" that he still had long to live. At the age of 102 he undertook a three-volume encyclopedia on archeology.

One of Bacon's aphorisms is to the effect that it is a miserable state of mind to have few things to desire and nothing to fear. He who would live long, and preserve that mental and physical balance which carries the spirit of youth beyond the borders of advanced age, must banish fear and preserve unimpaired an ever fresh and vigorous interest in the moving panorama of life as it passes before him.

"Call him not old, whose visionary brain
Holds o'er the past its undivided reign.
For him in vain the envious seasons roll
Who bears eternal summer in his soul.
If yet the minstrel's song, the poet's lay,
Or maiden's smile, or heavenly dream of art
Stir the few life-drops creeping round his heart,—

Turn to the record where his years are told,—
Count his gray hairs,—they cannot make him old!"

When the Twilight Has Come, What Then?—When the noonday of life is passed, and the shadows are lengthening in the evening glow, what then? Idleness? Hopelessness? Inactivity and impatient watching and waiting for the night to come? No!

One of the grandest old men whom the world has ever known, with characteristic cheerfulness, wrote:

"At sixty-two life has begun;
At seventy-three begin once more;
Fly swifter as thou nearest the sun
And brighter shine at eighty-four;
At ninety-five
Shouldst thou arrive,
Still wait on God, and work and thrive."

Vital statistics of various countries give numerous instances of remarkable mental and physical vigor retained far beyond the midday of life. A vast array of brilliant men might be mentioned who have reached or neared the century mark; those whose minds are occupied in some definite labor seemed to have the best record for longevity.

Zeno, founder of the Stoics, died at 100, and Diogenes, the old Cynic philosopher, lived to be 90. Galen, the great physician, although of feeble constitution, lived past 80. Cato, who learned Greek at 80, lived nearly a century. Titian, the great Venetian painter, after seventy-three years of work which will live many centuries more, ceased his labors at the age of 98 and died at 99. Sir Christopher Wren finished Saint Paul's Cathedral in his eightieth year, and completed other great works before he died, at 91. Sir Isaac Newton continued with incessant labor his philanthropic career, begun before he was 21, until his death at 85. Gladstone, Bismarck, von Moltke, Herbert Spencer, and a host of others, are examples of mental vigor retained to a good old age. King Christian, of Denmark, the "Universal father-in-law of royalty and the grandfather of all Europe," who died in 1907, in his eighty-eighth year, was said to have represented in "his simple life, his patriarchal years, and his illustrious progeny, the majesty that still doth hedge about the person of a king."

Among women of recent times whose lives amply disprove the theory of the uselessness of women after sixty, may be mentioned Queen Victoria, the Empress Dowager of China, Julia Ward Howe, Susan B. Anthony, and many others.

The men and women whom we have mentioned are among the host of those whose lives have been more or less public, and whose work is known by the world. There is, however, the greater army of the unknown, whose lives have been none the less beautiful and useful though not known and read of all men. We could never bring ourselves to pronounce the word "useless" in connection with the life of her of whom the poet said:

"She wears no royal robes of silken splendor,
No coronet above her brow so fair.

But, fitting emblem for a face so sweet and tender,
The shining radiance of her silver hair.

"She wields no scepter save of love and duty,
Our household saint before whose shrine we kneel—
But at her touch earth's common things gain beauty,
And on her head God sets his shining seal.

"Around each silver thread is twined a blessing.
Each tiny wrinkle cradles love's embrace.
Time's restless hand has traced, with soft caressing,
Life's holy record on the well loved face.

"O diadem of priceless worth and treasure,
Fit emblem of a life well spent!
With thoughts of thee, in recollections tender,
Our dearest hopes and memories are blent!"

In his "Comforts of Old Age," Sir Thomas Barnard said: "The close of life is seldom made the subject of preparatory contemplation. For while to some it is an object of terror, by others it is treated with affected neglect; and the greater part of mankind, immured in the cares and concerns of the world, and in a contest for the toys and baubles, the crowns and scepters, of the little scene in which they are acting a part, seem to have forgotten the great theatre to which they are ultimately destined." But life's evening will be no season of regrets and fears for those of whom it may be said,

> "Happy that life around whose close,
> The virtues all their rainbows cast,
> While wisdom and the soul's repose
> Make age more blest than all the past!"

As the close of Life's Day draws nearer, and the "House Wonderful" is seen to be weakening and ready to fall, it does not follow that the immortal tenant must be growing feeble or old. The experience of time, study and work, trust and faith, may have been keeping the soul fresh and bright year by year. Some men are old at thirty, others young at eighty.

PART VI

NIGHT

“ And again on the knee of a mild mystery
  That smiles with a change,
    Here we lie!
   O Death, O Beyond,
 Thou art sweet, thou art strange! ”

CHAPTER XIV

NIGHT

THROUGH the patient study of earnest minds, working in different directions, many of the problems connected with infancy, youth, middle life and old age have been solved. In the study of *life* scientists have learned something—not much—concerning that mystery of mysteries, *death*. They believe that death is not the necessary corollary of life, but that what is called "natural death" has been acquired during the process of evolution.

As we have seen, unicellular organisms multiply indefinitely by division, each new part being as much alive as the other. They die only by accident, never naturally. "Natural death" is the outcome of cellular differentiation, and we are coming more and more to realize that differentiation inevitably culminates in death. Death, as Minot has said, is the price we have to pay for our organization. Answering the question, "Is it too high a price to pay?" he replies: "To that organization we are indebted for the means of appreciating the sort of world, the kind of universe, in which we are placed. To it we are indebted for all the conveniences of existence by which we are able to carry on our physiological processes in a far better and more comfortable manner than can the lower forms of life. To it we are indebted for the possibility of those human relations which are among the most precious parts of our experience. And we are indebted to it, also, for the possibility of the higher spiritual emotions. All this is what we have bought at the price of death, and it does not seem to me too much to pay." Continuing, he says: "We accept the price. Death of the whole comes, as we now know, whenever some essential part of the body gives way—sometimes one, sometimes another; perhaps the brain, perhaps the heart, perhaps one of the other internal organs may be the first in which the change of cytomorphosis goes so far that it can no longer perform its share of work and, failing, brings about the failure of the whole. This is the scientific view of death. It leaves death with all its mystery, with all its sacredness."

The purely physical aspect of death should hold no terrors, for it is now universally believed among physicians that the actual leaving of life is not painful, but is usually accompanied by a blessed unconsciousness, a freedom from mental and physical suffering. "If death, then," says the great surgeon, Dr. W. W. Keen, "is not a painful process, and if it does for us so much, it should be, not the last *enemy,* but our best *friend;* not dreaded as the messenger of evil, but welcomed as a companion who will lead us into paths of pleasantness and reveal to us the joys for which we have been longing all our lives. We shall not speak of the terrors of death, but shall feel in our very hearts the cheerfulness of death."

Over and above whatever there may be of science, of mystery, of sacredness and of sadness associated with death, the centuries ring with the words, "Because I live ye shall live also." And when the mellow glow of the Twilight has deepened into the shadows of the Night, let us be not afraid; let us remember, rather, that after the Night comes a new Day, and that "only because of having died, does one enter into life," the life of the more glorious, the Eternal Day.

"Life! I know not what thou art,
But know that thou and I must part;
And when, or how, or where we met
I own to me's a secret yet.

"Life! we've been long together
Through pleasant and through cloudy weather;
'Tis hard to part when friends are dear—
Perhaps 't will cost a sigh, a tear;
Then steal away, give little warning,
Choose thine own time;
Say not 'Good-night,' but in some brighter clime
Bid me 'Good-morning.'"

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